INTERNATIONAL FOOD INFORMATION SERVICE

ifis

AB 34

February 1974

AFLATOXINS

LECTED FROM VOLUME 1 to 4
OOD SCIENCE AND TECHNOLOGY ABSTRACTS

PRICE £2.50

sponsored by

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks; Institut für Dokumentationswesen, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen; Zentralstelle für maschinelle Dokumentation, Frankfurt am Main..

Additional Services available from IFIS

CURRENT AWARENESS SERVICE

- Monthly searches of FSTA
- Personalized, computer assisted service
- Information available in 3 output formats
- Cost from £10 per year for references; £15 per year for abstracts
- Information selected to match your requirements on any aspect of Food Science and Technology

MAGNETIC TAPES

- Contains all information in FSTA, bibliographic data, abstracts, author and subject indexes
- 7– and 9– track IBM tapes available
- "Clean" tapes suitable for computer retrieval
- Cost £700 per year

Enquiries concerning the magnetic tape service should be addressed to;–

Dr. U. Schützsack
Institut für Dokumentationswesen,
6 Frankfurt/Main-Niederrad,
Herriostrasse, W. Germany.

See also back page

AFLATOXINS

VOLUMES 1-4

FOOD ANNOTATED BIBLIOGRAPHY No. 34

© INTERNATIONAL FOOD INFORMATION SERVICE,
LANE END HOUSE, NIRD,
SHINFIELD, READING, RG2 9AT,
ENGLAND.

ISBN 0 86014 039 3

First published in 1974

INTRODUCTION

Food Annotated Bibliographies (FABs) are collections of abstracts on specific topics in food science and technology. The topics are chosen by the staff of the International Food Information Service as being of particular interest or importance. The topics normally interest individual workers, who may not require the full information provided in Food Science and Technology Abstracts, from which the abstracts for the FABs are taken. The size and the cost of the FABs are controlled as much as possible with the interests of individual workers in mind.

Titles of the FABs now available are given on the back cover of this booklet. New titles are being added at the rate of about 10-20 per year. For up-to-date lists of FABs or suggestions for new topics please write to the address given overleaf. New subjects are searched for at least the five most recent volumes of Food Science and Technology Abstracts. Thereafter each FAB is updated monthly. Copies of each months abstracts on any topic may be obtained as indicated on the back cover of this publication. At the end of each volume of up-dating, the abstracts are merged and made available as a separate supplement to the original FAB.

Some of the larger FABs have been divided into sections to facilitate use. Abstracts are not printed in more than one section. The larger FABs also have subject indexes provided.

Copies of all original articles referred to in the abstracts may be bought (or occasionally borrowed) from the International Food Information Service. A form for ordering these is provided at the end of this FAB.

Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journals, patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would in any case encourage readers to write or telephone us with any comments or queries that they may have.

J. NEWTON,
ASSISTANT EDITOR

VOLUME 1

1 C 2
Growth and production of aflatoxins by Aspergillus flavus on red pepper (Capsicum frutescens L).
Schindler, A. F.; Eisenberg, W. V.
Journal of the Association of Official Analytical Chemists 51 (4) 911-12 (1968) [7 ref. En] [Division of Microbiology, Food and Drug Administration, Washington, D.C. 20204, USA]

Aspergillus flavus grew on a subtrate of crushed and fresh red pepper (Capsicum frutescens) and produced aflatoxins B_1 and G_1. In addition, there was a shift in the ratio of aflatoxins B_1 to G_1 as compared to the ratio of these aflatoxins when grown on a wort agar substrate. The increase in the proportionate amount of aflatoxin G_1 to aflatoxin B_1 extracted from the crushed red pepper was statistically significant at the 0.1% level. AS

1 C 3
Fluorodensitometric measurements of aflatoxins on TLC plates.
Pons, W. A.
Journal of the Association of Official Analytical Chemists 51 (4) 913-14 (1968) [7 ref. En] [southern Utilization Res. & Development Division, USDA, New Orleans, La. 70119, USA]

8 collaborators analyed a cottonseed meal extract spiked with known amounts of aflatoxins B_1, B_2, G_1, and G_2. Aflatoxins were resolved by thin layer chromatography on silica gel-coated plates and estimated by solid state fluorescence measurements on the plates. Average recovery values were 93-99% for individual aflatoxins and 97.8% for the total amount added. Coeff. of variation ranged from 3.6 to 15.7% for individual aflatoxins and 4.9% for total aflatoxins. The technique appears to be accurate and precise. It is proposed that collaborative study be initiated. AS

1 C 4
Zebra fish eggs and larvae as aflatoxin bioassay test organisms.
Abedi, Z. H.; McKinley, W. P.
Journal of the Association of Official Analytical Chemists 51 (4) 902-05 (1968) [17 ref. En] [Res. Lab., Food and Drug Directorate, Dept. Nat. Health and Welfare, Ottawa, Ontario, Canada]

Aflatoxin B_1 is acutely toxic to embryos and larvae of zebra fish, Brachydanio rerio (Hamilton-Buchanan). These organisms are sensitive to sub-microgram quantities of the toxin and can be used as bioassay test organisms. The larval response is easier to measure than embryonic response, and a standard dosage-mortality curve for the larvae can be developed in 33 h. As an aflatoxin bioassay test organism, the larvae of zebra fish have several advantages over other test organisms, including ducklings, embryos, and tissue cultures. They require no special skill or equipment and can be obtained easily in the laboratory throughout the

1 C 5
Aflatoxin B_1 hemiacetal.
Pohland, A. E.; Cushmac, M. E.; Andrellos, P. J.
Journal of the Association of Official Analytical Chemists 51 (4) 907-10 (1968) [13 ref. En] [Division of Food Chemistry, Food & Drug Administration, Washington, D.C. 20204, USA]

The acid-catalysed addition of water to the vinyl ether double bond of aflatoxin B_1 was investigated. The hemiacetal produced was biologically inactive to the chick embryo and to tissue cultures at respective concn. 80 and 50 times the minimum lethal dose of aflatoxin B_1. The structure of the hemiacetal was established and found to be identical to the hemiacetal reported as an intermediate in the total synthesis of racemic aflatoxin B_1. AS

1 C 14
Chemical induction of mutation or variation in aflatoxin-producing cultures of Aspergillus flavus.
Lee, E. G.-H.; Townsley, P. M.
Journal of Food Science 33 (4) 420-23 (1968)[6 ref. En] [Univ. of British Columbia, Vancouver 8, B.C., Canada]

The mutation of a strain of aflatoxin-producing Aspergillus flavus, was induced chemically after 6 successive generations of exposure to Ba ions. The new characteristics exhibited by the mutant of A. flavus are the inability to produce aflatoxins and yellow pigment, accompanied by the loss of fluorescence in the culture under UV light. These changes did not revert after 8 successive passages in a Ba-free medium. Chemical-induced mutation was indicated by the mutation of colonies arising from single spores. The mutation characteristics are permanent and irreversible. AS

1 C 17
Groundnut detoxification.
Council of Scientific & Industrial Research
British Patent 1 117 573 (1968) [En],

Groundnut products containing aflatoxin are treated with H_2O_2 at pH $\geqslant 9.5$ to oxidize the toxin. After cooling, the pH is adjusted to 7 and the residual H_2O_2 destroyed by addition of catalase. IFT

1 C 20
Appearance and aflatoxin content of raw and dry roasted peanut kernels.
Lee, L. S.; Cucullu, A. F.; Goldblatt, L. A.
Food Technology (Champaign) 22 (9) 1131-34 (1968) [7 ref. En] [Southern Utilization Res. & Development Division, Agric. Res. Service, USDA, New Orleans, Louisiana 70119, USA]

100 suspect kernels were hand picked from a sample of domestic peanuts that had been graded as sound, mature kernels. After roasting ½ of each kernel, assays for aflatoxins were conducted on both the raw and roasted portions of each

individual kernel using the micro technique developed by Cucullu et al. [J. Am. Oil Chem. Soc. (1966) 43: 89]. There was an average reduction of $\sim$80% in aflatoxin B_1 and $\sim$60% in aflatoxin B_2 after roasting for ½ h at 150°C. In most cases the roasted ½ of each kernel containing aflatoxins, although not deeply coloured, was darker than the roasted controls. Many of the raw halves appeared almost identical to normal peanuts. When the level of toxins was high in the raw kernels, some toxins were detected in the roasted portions. When the levels were low in the raw ½, toxins were generally not detectable after roasting. AS

---

1 C 21

A metabolite of Macrophomin aphaseoli (Maubl) Ashby, with thin-layer chromatographic behaviour similar to that of aflatoxin B.

Crowther, P. C.

Analyst 93 (1110) 623-24 (1968) [2 ref. En] [Tropical Products Inst., Ministry of Overseas Development, 56-62 Gray's Inn Road, London, W.C.1, England]

Thin-layer chromatoplates of extracts from infected groundnuts, apparently positive for aflatoxin B but having a green fluorescence in UV light near the solvent front, were redeveloped in ethyl ether. Aflatoxin did not move appreciably, but blue fluorescent spots which reached a high Rf value were due to an apparently harmless metabolite of M. phaseoli. TW

1 R 13

Temperature-dose relationships with aflatoxin on the brine shrimp, Artemia salina.l

Brown, R. F.; Wildman, J. D.

Journal of the Association of Official Analytical Chemists 51 (4) 905-06 (1968) [7 ref. En] [Division of Microbiology, Food & Drug Administration, Washington, D.C. 20204, USA]

Temp.-dose relationships with aflatoxin B_1 were studied, using the brine shrimp , Artemia salina. Increase in temp. resulted in increased sensitivity by the brine shrimp to aflatoxin. Optimum sensitivity occurred at 37.5°C. Positive results were obtained at 0.5 μg aflatoxin B_1/ml artificial sea water with a mortality of over 60%. Greater than 90% mortality occurred at dose levels of 1.0 μg/ml and above. The test can be conducted in 24 h, and highly trained personnel are unnecessary. AS

2 C 39

UV aflatoxin quantitation with polaroid recordings.

Chang, C-M.; Lynd, J. Q.

Agronomy Journal 60 (5) 582-84 (1968) [3 ref. En]

A method is presented for precise, permanent colour recordings of thin-layer chromatography plates used in aflatoxin quantitation. Improvement over black and white film recordings include close duplication of blue and yellow green chroma actually observed with UV fluorescence with less distortion from the differential intensities apparent between the B and G groups with aflatoxin concn. changes. AS

2 C 40

Factors influencing aflatoxin accumulation in peanut kernels and the associated mycoflora.

Pettit, R. E.; Taber, R. A.

Applied Microbiology 16 (8) 1230-34 (1968) [15 ref. En] [Dept. of Plant Sci., Agric. Expt. Sta., A & M Univ., College Station, Texas 77843, USA]

Accumulation of aflatoxin in Spanish peanut kernel samples from Texas during 1966, as detected by the thin-layer chromatographic method, was relatively low. Analysis of samples obtained from growers using artificial drying equipment (forced air and supplemental heat), when windrow conditions were unfavourable for rapid drying, suggests that this practice reduces the possibility of aflatoxin accumulation. In general, peanuts harvested from land planted with peanuts the previous yr were more highly infested with fungi and contained more aflatoxin than peanuts grown on land planted with rye, oats, melons, or potatoes the previous yr. Aflatoxin incidence tended to decrease from south to north Texas. These findings verify previous observations that moist tropical climates are conducive to fungal infection and aflatoxin accumulation. Detection of aflatoxin in sound mature kernels indicates that the practice of screening for removal of small immature kernels and removal of obviously damaged kernels does not completely eliminate aflatoxin contamination. AS

2 C 43

Aflatoxin in stored corn.

Trenk, H. L.; Hartman, P. A.

Bacteriological Proceedings 1968: 2 (1968) [En] [St. Univ., Ames, Iowa, USA]

Freshly harvested and rewet corn ranging in moisture content from 17.5 to 28% was stored at temp. from 1.7 to 35°C. Samples were analysed for aflatoxin content when the corn had reached specified levels of CO_2 production. Fungi were isolated, purified and screened for aflatoxin production. No aflatoxin was found in samples stored at temp. <13°C or moisture contents <19%. At moisture contents of 19-28%, toxin content increased linearly from 0.05 to 2 ppm B_1. Aflatoxins B_1 and B_2 were found in all positive samples, but G_1 and G_2 were found in only 1 sample. Of 27 Aspergillus flavus strains, 10 produced aflatoxin; these formed only B_1 and B_2 in pure culture. The authors conclude that, at moistures >17.5% and temp. >13°C, corn is susceptible to aflatoxin formation by A. flavus. AS

2 C 48

Removal of aflatoxins from oilseed meals by extraction with aqueous isopropanol.

Rayner, E. T.; Dollear, F. G

Journal of the American Oil Chemists' Society 45 (9) 622-24 (1968) [21 ref. En] [Southern Regional Res. Lab., New Orleans, Louisiana 70119, USA]

Aqueous isopropanol was found to be an [illegible]

contaminated cottonseed and peanut meals. Extraction with 6 passes of 80% aqueous isopropanol at 60°C resulted in completed removal of aflatoxins from both meals as measured by thin-layer chromatography. Under similar extraction conditions, the isopropanol-water azeotrope, (88% isopropanol by wt.), removed 88% of the total aflatoxins in peanut meal, a reduction from 82 to 10 parts/billion (ppb) and 79% of the total aflatoxins in cottonseed meal, a reduction from 214 to 46 ppb. Lower temp. were less effective with both solvent systems. AS

2 C 59

The production of aflatoxin M on various substrates.

Purchase, I. F. H.; Steyn, M.; Pretorius, H. E.

Mycopathologia et Mycologia Applicata 35 (3/4) 239-44 (1968) {11 ref. En] [Nat. Nutrition Res. Inst., C.S.I.R., Pretoria, South Africa]

The ability of 44 strains of Aspergillus flavus and 6 strains of A. parasiticus to produce aflatoxins M, B and G on various substrates, including rice, groundnuts, maize meal and cottonseed, was investigated. The results are tabulated. The highest yield of aflatoxin M was produced by strain G 216 on maize. EJM

2 J 162

Speed peanut inspection.

Anon.

Agricultural Research (Washington) 17 (4) 3-4 (1968) [En]

A rapid test for tentative identification of Aspergillus flavus infection by visual examination before putting peanuts into segregation bins gave 87% correct results. Unskilled workers could be taught in 1 h followed by 2-3 h supervision. A simplified test for detecting aflatoxin in peanuts used a min. of equipment and could be performed in 15 min at the marketing site. No instructions are given for performing the test, (which was used by the Federal-State Inspection Service). RM

3 C 76

The bioassay of aflatoxins and related substances with Bacillus megaterium spores and chick embryos.

Jayaraman, A.; Herbst, E. J.; Ikawa, M.

Journal of the American Oil Chemists' Society 45 (10) 700-02 (1968) [12 ref. En] [Dept. Biochem., Univ., Durham, New Hampshire 03824, USA]

The "paper disc plate" method of antibiotic assay using Bacillus megaterium spores was tested for the assay of aflatoxins and related compounds. Significant inhibitions were obtained in the range of 1-4 μg/disc for aflatoxin B_1 and 4-8 μg/disc for aflatoxin G_1. Dicumarol was the most active of the compounds tested and inhibited at 0.1-1.0 μg/disc. Compounds were also tested using 9-day-old chick embryos. It was found that embryos incubated in egg cartons were much more sensitive to toxins than eggs incubated on cotton padding or in a commercial egg incubator. The LD_{100} of aflatoxin B_1 to carton-incubated embryos was 0.01 μg, while to embryos from the commercial incubator the LD_{100} was >5.0 μg. The results of the 2 bioassay procedures did not correlate completely with each other. AS

3 C 77

Aflatoxins B_1, B_2, G_1, and G_2: separation and purification.

Stubblefield, R. D.; Shotwell, O. L.; Shannon, G. M.

Journal of the American Oil Chemists' Society 45 (10) 686-88 (1968) [10 ref. En] [Northern Regional Res. Lab., Peoria, Illinois 61604, USA]

Aflatoxins B_1, B_2, G_1 and G_2 were separated and isolated from crude precipitates obtained from mouldy wheat and rice. Silicic acid columns eluted with washed chloroform: ethanol (99:1 v/v) separated 50% aflatoxin B_1 and other impurities. The remaining aflatoxins from this column were fractionated further into free B_1, B_2, G_1 and G_2, in good yields, on Silica Gel G columns eluted with washed chloroform:acetone:ethanol (97.3:2.0:0.75 v/v). Individual aflatoxins, treated with either decolorizing C or $CuCO_3$ to remove coloured pigments, were purified by chromatography on Silica Gel G. Crystalline aflatoxins were prepared from chloroform solutions by addition of n-hexane, methanol, or ethanol. JA

3 C 78

Effect of carbon dioxide, temperature, and relative humidity on production of aflatoxin in peanuts.

Sanders, T. H.; Davis, N. D.; Diener, U. L.

Journal of the American Oil Chemists' Society 45 (10) 683-85 (1968) [11 ref. En] [Botany & Plant Pathology Dept., Agric. Expt. Sta., Auburn Univ., Alabama 36830, USA]

Effects of CO_2 in combination with reduced relative humidities (RH) and temp. on growth and aflatoxin production by Aspergillus flavus in peanuts were investigated. Sound mature kernels of Early Runner peanuts were surface disinfested, inoculated with A. flavus, and incubated at various temp., RH, and CO_2 concn. Visible growth, aflatoxin production, and free fatty acid (FFA) formation by A. flavus was inhibited at ~86% RH by 20% CO_2 at 17°C and at 60% RH and 40% CO_2 at 25 Aflatoxin and FFA levels decreased as RH decreased from ~99% to 92% to 86%. At a constant temp., an increase in CO_2 concn. caused a decrease in aflatoxin and % FFA; and, at a given CO_2 concn., lowering the temp. resulted in a decrease in aflatoxin and % FFA. AS

3 C 79

Rapid method for detecting aflatoxins in peanuts.

Holaday, C. E.

Journal of the American Oil Chemists' Society 45 (10) 680-82 (1968) [3 ref. En] [Field Crops & Animal Products Res. Branch, Market Quality Res. Branch, Agric. Res. Service, USDA, Albany, Georgia, USA]

A method based on millicolumn chromatography w tested and found to be rapid and simple. Columns were prepared by filling a length of 4 mm glass tubing with silica gel to a depth of ~4.5 cm. The millicolumn was developed in a chloroform-methanol extract of a peanut sample. If aflatoxin is present a blue fluorescent band at the lower

end of the column is observed when the column is exposed to long-wave UV radiation.
Sensitivity is in the order of 5 parts/billion and an assay can be completed in 15-25 min. Some degree of quantification is possible by comparison with columns developed in extracts with known aflatoxin contents. AS

3 C 91

Aflatoxin formation by Aspergillus flavus and Aspergillus parasiticus in a casein substrate at different pH values.

Lie, J. L.; Marth, E. H.

Journal of Dairy Science 51 (11) 1743-47 (1968) [24 ref. En] [Dept. of Food Science and Ind., Univ., Madison, Wisconsin, USA]

Samples of acid curd obtained from skim-milk were adjusted to pH range of 1.0-11.35 with HCl and NaOH (series I) and to 1.8-10.7 with lactic acid and NH_4OH (series II). All samples were inoculated with spore suspensions of Asp. flavus and Asp. parasiticus and held at ambient temp. for 21 days. Growth wa observed at pH values of (I) 1.7-9.9 and (II) 3.1- 7.0 after 6 days; no growth occurred at any other pH values during the next 11 days. pH of most samples approached neutrality after 10-14 days from initial pH of (I) 3.0-9.9 and (II) 4.2- 7.0. Aflatoxins B_1 and G_1 were produced at all pH values where growth occurred, their levels, measured after 21 days, being highest at the extremes of pH. [See J. Dairy Sci (1967) 50 (10) 1708] CDA

3 C 92

Improved objective fluorodensitometric determination of aflatoxins in cottonseed products.

Pons, W. A., Jr.; Cuculla, A. F.;
Franz, A. O., Jr.; Goldblatt, L. A.

Journal of the American Oil Chemists' Society 45 (10) 694-99 (1968) [13 ref. En] [Southern Regional Res. Lab., New Orleans, Louisiana 70119, USA]

Modifications in the extraction solvent, lead acetate, and silica gel extract purification steps and the thin layer chromatographic development conditions of the aqueous acetone procedure of Pons et al. [J. Am. Oil Chem. Soc. (1966) 49: 554] for the estimation of aflatoxins in cottonseed products, provides an improved method with essentially quantitative recovery of aflatoxins added to typical cottonseed materials. Both the accuracy and precision of aflatoxin estimates were significantly improved by the incorporation of an objective fluorodensitometric measurement of aflatoxins on thin layer chromatography plates. AS

3 C 97

Luminescence characteristics of aflatoxins B_1 and G_1.

Duuren, B. L. van; Tze-Loch Chan; Irani, F. M.

Analytical Chemistry 40 (13) 2024-27 (1968) [24 ref. En] [Lab. of Organic Chem. & Carcinogenesis, Inst. of Environmental Med., Univ. Medical Center, New York, N.Y. 10016, USA]

A study of fluorescence and phosphorescence characteristics of aflatoxins B_1 and G_1 was carried out. A self-correcting luminescence spectrophotometer was used and it was found that characteristic fluorescence spectra of these toxins could be recorded for sub-μg quantities (10^{-2} to 10^{-4} μg/ml). The sensitivities for the detection of these substances by fluorescence and thin-layer chromatography were compared. The corrected fluorescence emission and excitation spectra of both aflatoxins were measured at room temp. and at 77°A and in KBr. In their fluorescence, they exhibit a blue shift when measured at 77°A compared to their room temp. solution spectra. Phosphorescence spectra and decay curves were also recorded. AS

3 C 120

Solid state fluorescence emission of aflatoxins on silica gel.

Robertson, J. A.; Pons, W. A., Jr.

Journal of the Association of Official Analytical Chemists 51 (6) 1190-92 (1968) [5 ref. En] [Southern Regional Res. Lab., New Orleans, La. 70119, USA]

The solid state emission max. of aflatoxins B_1, B_2, G_1, G_2, on silica gel and in acetonitrile are B_1 432 nm and 415 mm; B_2, 427 nm and 412 nm; G_1, 455 nm and 440 nm; G_2, 450 nm and 437 nm respectively. The exitation max. are at 368-369 nm in silica gel and 360 nm in acetonitrile. The fluorescence intensity order in the solid state is $B_2 > G_2 > B_1 > G_1$, compared with $G_2 > B_1 > G_1 > B_1$ in methanol and ethanol, and $G_2 > G_1 > B_2 > B_1$ in chloroform and acetonitrile. The author concludes that authentic standards are necessary for the measurement of aflatoxins in unknown extracts. BSG

3 C 121

Instrumental evaluation of aflatoxin resolution on TLC plates.

Pons, W. A., Jr.; Goldblatt, L. A.

Journal of the Association of Official Analytical Chemists 51 (6) 1194-97 (1968) [11 ref. En] [Southern Regional Res. Lab., New Orleans, La. 70119, USA]

An objective instrumental evaluation system is suggested for determining the degree of resolution of aflatoxins on thin layer chromatographic (TLC) plates coated with silica gel. The plates were spotted with a standard containing aflatoxins B_1, B_2, G_1 and G_2, developed, and scanned with a densitometer equipped for fluorescence measurement. Numerical resolution factors were calculated from the recorder traces and used as an index of degree of separation of the aflatoxins. AS

4 C 137

Rapid confirmatory test for aflatoxin B_1, using Bacillus megaterium.

Clements, N. L.

Journal of the Association of Official Analytical Chemists 51 (6) 1192-94 (1968) [En] [Division of Microbiology, Food and Drug Administration, Washington, D.C. 20204, USA]

The test, intended to supplement thin layer chromatography, is based on growth inhibition of B. megaterium NRRL-B-1368 by aflatoxin B_1, the most common and most toxic of the 4 aflatoxins found in foodstuffs, and requires no special additions to the normal facilities of a microbiological lab. The method employs a disc assay technique and full details are given of the agar medium; of preparation of the standard suspension of B. megaterium spores, inoculated test plates and test aflatoxin discs; of incubation and examination of test discs placed on seeded plates. Zones of growth inhibition by as little as 1.0 μg aflatoxin B_1 are detectable in 15-18 h or earlier. ELC

4 C 138

Note on a rapid thin layer chromatographic method for the isolation of aflatoxin B_1.

Hanna, K. L.; Campbell, T. C.

Journal of the Association of Official Analytical Chemists 51 (6) 1197-99 (1968) [10 ref. En] [Dept. of Biochem. and Nutrition, Polytechnic Inst., Blacksburg, Virginia 24061, USA]

The method was developed for the isolation and preparation of sufficient quantities of pure aflatoxin B_1 for the needs of further research. Aspergillus flavus is grown for 7 days on mycological agar, the spores then removed with 0.01% sodium lauryl sulphate and inoculated into sterilized rice. After incubation at 27°C for 5 days the rice culture is extracted with $CHCl_3$ for 16 h in the dark. $CHCl_3$ extract is streaked on a chromatographic plate with a 2 mm layer of silica gel PF_{254} at $\sim$270 mg material/plate. A solvent system of 15% acetone in chloroform is the most satisfactory. After 15 cm development distance the B_1 band is identified under UV light and the spot removed with the silica gel, from which it is eluted, purified, and dried, 1 worker can prepare 1 g/day pure aflatoxin B_1 from rice cultures. The yield is much reduced by exposure to light at all stages. ELC

5 C 182

A method for the analysis of cereals and groundnuts for three mycotoxins.

Vorster, L. J.

Analyst 94 (1115) 136-42 (1969) [14 ref. En] [Nat. Nutrition Res. Inst. of the South African Council for Sci. and Industrial Res., P.O. Box 395, Pretoria, R. of South Africa]

A method for the quantitative determination of aflatoxin (i), ochratoxin (ii), and sterigmatocystin (iii) in 1 extract of maize, sorghum or groundnuts is described. The method involves separation of the mycotoxins by column chromatography on silica gel, followed by thin layer chromatography and matching of the fluorescence intensity of sample spots with that of spots from standard solutions of (i), (ii) or (iii). For samples with high fat content the method is modified by a $NaHCO_3$ extraction of the mycotoxins from the sample extract. Dark coloured pigments are removed from the sample extract by treatment with Hyflo Supercel. The method is fast and gives results accurate to ± 20% at concn. of 10-500 μg/kg (i), 50-2000 μg/kg (ii) and 200-2000 μg/kg (iii). [illegible]

5 C 199

[Determination of aflatoxins and occurrence of aflatoxin-like substances in foods.] Über den Nachweis von Aflatoxinen und das Vorkommen Aflatoxin-vortäuschender Substanzen in Lebensmitteln.

Frank, H. K.; Eyrick, W.

Zeitschrift für Lebensmitteluntersuchung und Forschung 138 (1) 1-11 (1968) [20 ref. De] [Bundesforschungsanstalt für Lebensmittelfrischhaltung, Karlsruhe, W. Germany]

The authors confirmed that foodstuffs contain certain substances which display the thin-layer chromatographic properties of the toxic and pathogenic mould metabolite, aflatoxin. If blue or green fluorescent spots appear in the R_f region of the internal or external standard, several developers, following those recommended by Scott et al. [Appl. Microbiol. (1967) 15: 945], should be used. Sprays which enable a clear differentiation from standard aflatoxin to be obtained are listed. True aflatoxin was detected in samples of wheat flour, soft wheat semolina, mouldy wholemeal bread, groundnut puree, pea flour and dietary wholemeal bread prepared according to specification. PU

5 C 216

Aflatoxin produced by 1626 isolates of Aspergillus flavus from groundnut kernels and soils in Israel. [A letter]

Joffe, A. Z.

Nature (London) 221 (5179) 492 (1969) [12 ref. En] [Dept. of Botany, Hebrew Univ., Jerusalem, Israel]

1626 isolates of Aspergillus flavus, derived from groundnuts and from soil of groundnut fields, were tested for their potential to produce aflatoxin. 10.4% produced no toxin, 1.7% produced aflatoxin B_2 only, 79.5% produced aflatoxins B_1 and B_2 and 8.4% produced all 4 aflatoxins. Quantitative thin layer chromatography performed on 750 of the isolates showed that some isolates produced as much as 1 500 000 parts/billion (ppb) (μg aflatoxin B_1/kg of substrate) while others produced only 50 ppb. >60% of isolates produced aflatoxin in excess of 25 000 ppb. Source of isolate had no connection with its degree of toxicity. VJG

6 C 230

Screening cottonseed for aflatoxins.

Whitten, M. E.

Journal of the American Oil Chemists' Society 46 (1) 39-40 (1969) [7 ref. En] [Market Quality Res. Division, USDA, Beltsville, Maryland 20705, USA]

A rapid screening method for detecting aflatoxins in cottonseed has been developed. Using UV light and samples containing aflatoxins, the fibres on a few cottonseed fluoresced a greenish yellow and the ends of some sticks and stems (foreign material) fluoresced with a bluish colour. 9 out of 10 of the 2300 samples of cottonseed were correctly screened during 2 yr. In only 1 category, 1-10 parts/billion aflatoxins, was there an appreciable error in the screening method. AS

6 C 238
Non-interference of seed coat constituents of cotton seeds using the Pons and Goldblatt aflatoxin procedure.
Campbell, T. C.; Snider, J. H.
Journal of the American Oil Chemists Society 46 (1) 31-33 (1969) [6 ref. En] [Biochem. and Nutrition, Virginia Polytechnic Inst., Blacksburg, Virginia 24061, USA]

Normal constituents of seed coats and fibres of fuzzy cottonseeds were not found to interfere with aflatoxin analyses. Several technique modifications of the Pons and Goldblatt procedure for aflatoxin analyses in cottonseed are presented which aid not only in making better defined spots but also improve thin-layer chromatography (TLC) resolution. The so-called blue spot of Ashworth was not found to either partially or totally obscure aflatoxin B_1 on the plates, as claimed by these workers. An improved method of aflatoxin estimation on TLC plates is presented. AS

6 J 530
Detecting farmers' stock peanuts containing aflatoxin by examination for visible growth of Aspergillus flavus.
Dickens, J. W.; Welty, R. E.
Mycopathologia et Mycologia Applicata 37 (1) 65-69 (1969) [4 ref. En] [St. Univ., Raleigh, N. Carolina, USA]

Cultural examination confirmed Aspergillus flavus infection in 132 out of 152 portions of peanut kernels in which infection had been tentatively identified by visual examination. From 1788 samples with 0.0-2.5% damage, 46 of 84 samples tentatively identified as having visible A. flavus contained an average of 230 μg of aflatoxin/kg of peanuts, compared with an average of 41 μg/kg in 23 of 1704 samples with no A. flavus. Among 319 samples with more than 2.5% damage, 15 of the 20 samples tentatively identified as having visible A. flavus contained aflatoxin and averaged 1676 μg/kg, compared to an average of 41 μg/kg in 24 of 298 samples with no A. flavus detected. Possible reasons are outlined for (i) the occurrence of kernels classified as containing A. flavus but found not to contain aflatoxin, and (ii) failure to detect A. flavus in all samples containing aflatoxin. EJM

7 C 280
A simplified procedure for the determination of aflatoxin B_1 in cottonseed meals.
Velasco, J.
Journal of the American Oil Chemists' Society 46 (2) 105-07 (1969) [9 ref. En] [Market Quality Res. Division, USDA, Beltsville, Maryland 20705, USA]

A single chromatographic column of celite is used to concentrate and purify the aflatoxin fractions. A new solvent system of ether-methanol-water (96:3:1) improves separation of aflatoxin fractions on TLC plates. This improvement permits measurement of B_1 spots in 1 sweep of the plate with a densitometer using a 10-15 mm slit. The number of samples which can be screened for aflatoxin contamination on 1 TLC plate is doubled by re-use of the plate. The procedure is sensitive to ~5 μg of B_1/kg of meal. AS

7 C 281
An improved rapid physicochemical assay method for aflatoxin in peanuts and peanut products.
Waltking, E.; Bleffert, G.; Kiernan, M.
Journal of the American Oil Chemists' Society 45 (12) 880-84 (1968) [21 ref. En] [Res. Lab., Best Foods Division, Corn Products Co., Bayonne, New Jersey 07002, USA]

A rapid method, based on modifications to the current official methods for measuring aflatoxin [see J. Assoc. Offic. Agric. Chem. (1966) 49: 229; (1968) 51: 485 & 488] is described. By reducing solvent vol., using pressure filtration for clarification and substituting liquid:liquid extraction for a column clean-up, the time taken to analyse a sample of peanuts was reduced from ~3 h to 1 h. The sensitivity and accuracy are comparable to those of the current official methods. MEG

7 C 282
Elimination of aflatoxins from peanut meal.
Dollear, F. G.; Mann, G. E.; Codifer, L. P., Jr.; Gardner, H. K., Jr.; Koltun, S. P.; Vix, H. L. E.
Journal of the American Oil Chemists' Society 45 (12) 862-65 (1968) [24 ref. En] [Southern Regional Res. Lab., New Orleans, Louisiana 70119, USA]

Heating peanut meal containing aflatoxins in the presence of moisture and chemicals (NH_3, methylamine, NaOH and ozone) was effective in either destroying aflatoxins or greatly reducing aflatoxin levels as indicated both by thin layer chromatographic analysis and feeding expt. with ducklings and rats. Wt. gains for animals receiving treated meals were essentially comparable to those for animals receiving aflatoxin-free meal. Treated meals, however, had somewhat reduced protein efficiency ratios (PER) as indicated by rat feeding tests. Complete elimination of aflatoxins from contaminated peanut meal was achieved by extraction with 90% acetone-10% water (w/w) solvent system. The extracted aflatoxin-free peanut meal gave good growth in duckling and rat feeding tests, and had a relatively high PER. AS

7 C 298
[Food deterioration caused by aflatoxin B_1.]
Schädigung von Lebensmitteln durch Aflatoxin B
Hanssen, E.
Naturwissenschaften 56 (2) 92 (1969) [7 ref. D
[H. Bahlsens Keksfabrik KG, Hannover, W.

Mouldy foods can be toxic even after dis the surface mycelium because of the diffusio aflatoxin. In addition to Aspergillus flavus the following were found to produce appreciable amounts of aflatoxin in various foods: A glaucus, A. niger, Penicillium glaucum, P. expansum, P. citromyces, P. digitatum and mucedo. BR

[illegible]
Quantitative method for the estimation of aflatoxins in peanuts and peanut products.
Mayura, K.; Sreenivasamurthy, V.
Journal of the Association of Official Analytical Chemists 52 (1) 77-81 (1969) [8 ref. En] [Central Food Technological Res. Inst., Mysore, India]

A spectrophotometric method for measuring aflatoxins B_1, B_2, G_1 and G_2 in peanuts is described. The sample extracts were freed from fat and pigments by a 3-stage purification which included partition of the toxin between petroleum ether and water and passing the extract through 2 alumina beds. Total aflatoxins in the purified extract were measured by absorption at 360 nm. The procedure for the quantitative estimation of the 4 individual toxins was based on the separation of aflatoxins G_1 and G_2 from B_1 and B_2 by adsorption on an alumina column and the destruction of B_1 and G_1 by HNO_3. Recoveries of aflatoxins B_1 and G_1 added to commercial peanut samples were good. MEG

7 C 300
Analysis of cocoa beans for aflatoxins.
Scott, P. M.
Journal of the Association of Official Analytical Chemists 52 (1) 72-74 (1969) [8 ref. En] [Food and Drug Directorate, Dept. of Nat. Health and Welfare, Ottawa, Ontario, Canada]

The CB (Contaminants Branch, FDA) method [J. Ass. off. analyt. Chem. (1966) 49: 1218-23] for analysis of peanut products for aflatoxins was modified to overcome the problem of an insoluble final residue when applied to cocoa: a 25% $AgNO_3$ solution is used as the aqueous phase in the extraction procedure and the chloroform extract is re-shaken with this reagent before column chromatography on silica gel. Good backgrounds are obtained on thin layer chromatography plates when the method is applied to powdered cocoa beans initially defatted with n-hexane. Recoveries of added aflatoxins are satisfactory (80-90%). AS

7 C 301
Collaborative study on the determination of aflatoxins in cottonseed products.
Pons, W. A., Jr.
Journal of the Association of Official Analytical Chemists 52 (1) 61-72 (1969) [12 ref. En] [Southern Regional Res. Lab., New Orleans, Louisiana 70119, USA]

12 lab. collaboratively studied a method for estimating aflatoxins in cottonseed products, using both visual and fluorodensitometric estimation of aflatoxins on thin layer chromatography plates. Average recovery of total aflatoxins ($B_1 + B_2$) added to 5 products was 85% by visual and 90% by densitometric estimation; average coeff. of variation were 18 and 12%, respectively. Within- and between-lab. precision was essentially equivalent for both types of measurement, with no significant systematic errors among the lab. There was a high degree of correlation between visual and densitometric estimation of aflatoxins. [See also FSTA (1969) 1 1C3.] AS

7 C 302
The effect of some mycotoxins on the brine shrimp, Artemia salina.
Brown, R. F.
Journal of the American Oil Chemists' Society 46 (2) 119 (1969) [3 ref. En] [Division of Microbiology, Food and Drug Administration, Dept. of Health, Education and Welfare, Washington, D.C. 20204, USA]

The use of the brine shrimp, Artemia salina, for the bio-assay of mycotoxins is suggested. Aflatoxin B_1 at concn. of 1.0 and 0.5μg/ml produced 90 and 61% mortality after 24 h at 37.5°C. Partially purified ochratoxin A at levels of 1.0, 2.0 and 16.0 μg/ml produced 15, 23 and 49% mortality. The test requires only 0.5 ml of artificial sea water, which can maintain up to 50 brine shrimp larvae. [See also FSTA (1969) 1 1R13.] MEG

7 C 335
[Aflatoxin production in cereal products. Influence of different conditions.]
Jemmali, M.; Poisson, J.; Guilbot, A.
Annales de la Nutrition et de l'Alimentation 23 (2) 151-66 (1969) [24 ref. Fr] [Section de microbiologie, Sta. de biochimie et physico-chimie des cereales, l'INRA, 16, rue Nicolas-Fortin, 75-Paris, France]

Standard suspensions of spores of Aspergillus flavus were used to inoculate different cereal products. The production of aflatoxin on incubation at different temp. and humidities was measured. With 95% humidity development of A. flavus on maize germ was more rapid at 30°C than at 22°C. Aflatoxin was only produced slowly at 13°, but increased rapidly at 22° and 30° up to about the 18th day, after which it decreased. With 85% humidity there was no growth of A. flavus at 13°C. These conditions are therefore recommended for storing cereals. Aflatoxin production was shown to be higher on cereal products prepared by dry methods (e.g. milling) than on those produced by wet methods (as in starch production) suggesting a requirement for some water-soluble factor. MEG

7 C 336
Use of microslides for the rapid thin layer chromatography of aflatoxins.
Eppley, R. M.
Journal of the Association of Official Analytical Chemists 52 (2) 311 (1969) [4 ref. En] [Division of Food Chem. and Technology, Food and Drug Administration, Washington, D.C. 20204, USA

7 C 337
Note on a new developer for thin layer chromatography of aflatoxins on silica gel plates.
Teng, J. I.; Hanzas, P. C.
Journal of the Association of Official Analytical Chemists 52 (1) 83-84 (1969) [2 ref. En] [American Crystal Sugar Co., Rocky Ford, Colorado 81067, USA]

The separation of aflatoxins B_1, B_2, G_1 and G_2 by thin-layer chromatography an Mallinckrodt silica gel plates is described. The plates were developed with chloroform:acetone:n-hexane (85:15:20) in place of the chloroform:acetone (9:1) previously used by Eppley [J. Ass. off. analyt. Chem. (1966) 49: 473]. MEG

7 C 338
The separation of aflatoxin infected groundnut kernels.
Pattinson, I.; Crowther, P.; Noubey, H. E.
Tropical Science 10 (4) 212-21 (1968) [12 ref. En] [F.A.O., Rome, Italy]

In field trials at Dar-es-Salaam from Aug. to Nov. 1967, 2 varieties of groundnut kernels, a Natal common type (i) and a Virginia type (ii), were cleaned by passing through a pneumatic air separator to remove dust, string, loose skins and light-wt. kernels. After grading into different sizes, the kernels were passed through a colour sorting machine which rejected infected nuts. The mean aflatoxin contents of (i) and (ii) before treatment were 0.05 and 0.29 ppm. Air separator rejects from (i) and (ii) contained 0.15 and 0.36 ppm. Size grading conc. the aflatoxin in the medium and small sizes of (ii) but had no selective effect on (i). Colour sorting of both (i) and (ii) yielded 88% of accepted kernels with <0.005 ppm aflatoxin. The remainder comprised 10% with $\leqslant 0.1$ ppm and 2% with $\leqslant 0.5$ ppm. MEG

7 C 339
Reduction in aflatoxin contamination of rice by milling procedures.
Schroeder, H. W.; Boller, R. A.; Hein, H.
Cereal Chemistry 45 (6) 574-80 (1968) [12 ref. En] [USDA, Market Quality Res. Division, Coll. Sta., Texas, USA]

56 samples of rough rice (Belle Patna variety) were stored over water in screen baskets suspended in wide-mouthed jars. 42 samples were inoculated with spores of a strain of Aspergillus parasiticus, 14 were similarly treated but without inoculation. All samples were incubated at 30°C. 3 inoculated and 1 control were removed from storage at 3-day intervals. The rice was milled and the combined bran polish fraction and 50 g of milled rice were assayed for aflatoxin content. Max. concn. of aflatoxins were produced and accumulated after 15-33 days. $>90\%$ of the kernels were infected with Aspergillus flavus group spp. within 3-6 days. After 21 days in storage, ~60-80% by wt. of toxins produced were found in the combined bran and polish fraction after milling The bran and polish fraction contained the toxins in a concn. >10 times that of the milled kernels. VJG

7 C 351
Aflatoxin-producing potential of fungi isolated from cured and aged meats.
Bullerman, L. B.; Ayres, J. C.
Applied Microbiology 16 (12) 1945-46 (1968) [10 ref. En] [Dept. of Dairy and Food Ind., St. Univ., Ames, Iowa 50010, USA]

Moulds may be present in large numbers on the surface of cured and aged meats, from which the authors obtained many isolates of Aspergillus and Penicillium spp. Of the moulds tested, only 1 isolate of A. flavus (from salami) produced chloroform-extractable, fluorescent compounds which coincided with aflatoxin standards on thin-layer chromatographic plates. The organism did not sporulate readily in the lab. but this was improved by flushing with sterile moistened air. The fluorescent compounds were isolated, separated and purified, and coincided exactly with standard aflatoxins. Biological toxicity of a fraction corresponding to aflatoxin B_1 was confirmed with chick embryos and ducklings. ELC

7 C 352
Aflatoxin decontamination.
Ciegler, A.; Lillejoj, E. B. (United States of America, Department of Agriculture)
United States Patent 3 428 458 (1969) [En]

Human and animal foodstuffs are mixed with the Flavobacterium aurantiacum NRRL B-184 to destroy any aflatoxin present. IFT

7 C 353
Aflatoxin decontamination.
Masri, M. W.; Vix, H. L. E.; Goldblatt, L. A. (United States of America, Department of Agriculture)
United States Patent 3 429 709 (1969) [En]

Agricultural products contaminated with aflatoxin are de-toxified by mixing with $\geqslant 0.3$ g NH_3/kg and heating the mixture at 70-250°F. IFT

8 C 362
Separation and purification of aflatoxins B_1, B_2, G_1 and G_2, and comparison of semi-synthetic aflatoxins B_2 and G_2 with naturally-occurring aflatoxins B_2 and G_2.
Rodricks, J. V.
Journal of the American Oil Chemists' Society 46 (3) 149-51 (1969) [6 ref. En] [Division of Food Chem. and Technology, Bureau of Sci., Food and Drug Administration, Washington, D.C. 20204, USA]

A method is described for the isolation of highly purified aflatoxins B_1, B_2, G_1 and G_2 from extracts of Aspergillus flavus. The 4 aflatoxins, isolated from background impurities by rapid passage of the extracts through an acid alumina column, are separated from each other by chromatography on a silica gel column. Aflatoxins B_2 and G_2 are prepared by hydrogenation of the mixture of aflatoxins B_1, B_2, G_1 and G_2 and then separated by elution from a silica gel column with chloroform containing 0.7% ethanol. A comparison of semi-synthetic aflatoxins B_2 and G_2 with naturally-occurring aflatoxins B_2 and G_2 shows no significant difference in physical properties. AS

8 C 363
[Aflatoxins. I. Causal agents. II. Manifestations of toxicity. III. Methods of prevention and detoxication.] [A review]
Adrian, J.; Lunven, P.
Oleagineux 24 (1) 31-35; (2) 83-86; (3) 155-61 (1969) [176 ref. Fr, en, es] [CNRS, 92-Bellevue, France]

A comprehensive review of the subject is given, dealing with: origin of toxins; conditions of formation of toxins; foodstuffs affected; chemistry and methods of estimation; poisoning syndrome; sensitivity of different animal species; prevention and detoxication. RM

8 C 378
[Rearing problems posed by the presence of aflatoxins in feedstuffs.] [A review]
Fehr, P. M.
Alimentation et la Vie 56 (10/11/12) 250-73 (1968) [129 ref. Fr]

This review gives an account of the effect of consuming feedstuffs contaminated with aflatoxin on the health, metabolism and performance of domestic animals (poultry, rabbits, pigs, cattle and sheep). Means of controlling the adverse effects of aflatoxin are discussed and among the remedies suggested are (i) selection of resistant animals and (ii) storage of the feedstuffs under conditions which do not favour the growth of Aspergillus niger. MEG

8 C 409
Sampling stored corn for aflatoxin assay.
Johnson, R. M.; Greenaway, W. T.; Golumbic, C.
Cereal Science Today 14 (2) 25-29 (1969) [2 ref. En] [Field Crops and Animal Products Res. Branch, Agric. Res. Service, USDA, Beltsville, Maryland, USA]

2 bins of corn stored since 1955 and known to contain aflatoxin were sampled in 1965, 1 sample being drawn at each of 8 2-ft levels in each of 4 quadrants. In 1967, 200-g samples were drawn from all 4 quadrants of each bin at 6 successive 2-ft levels. Single-probe composite samples (~$2\frac{1}{2}$ lb each) and double-probe composite samples (~5 lb each) were drawn from the entire depth of 12 ft of each quadrant. In all 3 sampling procedures the entire sample was ground, thoroughly blended and 3 50-g subsamples tested for aflatoxin content using the method of Pons and Goldblatt [J. Am. Oil Chem Soc. (1965) 42: 471]. No significant F values were found in 1965 and 1967 for levels, quadrants or bins, indicating that the aflatoxin kernels were randomly distributed throughout the corn. Analyses of variance for both bins in 1967 showed that the SD was 41.6 parts/billion aflatoxin General means for aflatoxin content agreed closely between yr, even though the range of results was great and their distribution did not ap[illegible] normal. 75% work and time could have been saved [illegible] testing 6 or 8 samples from any 1 quadrant rather [illegible] 24 or 32 samples from the entire [illegible] Comparison of means and standard errors for quadrants and bins indicate that this shorter procedure would not have decreased the accuracy significantly. In most commercial samples where probability for failure to detect aflatoxin is no doubt very high, number of samples needed would be much greater. VJG

9 C 418
Aflatoxins. [A review]
Jones, N. R.; Jones, B. D.
Voeding 30 (6) 330-36 (1969) [57 ref. En] [Tropical Products Inst., London, England]

9 M 627
[Preliminary examination of some cereal products for presence of aflatoxin B_1.]
Lemieszek-Chodorowska, K.; Snycerski, A.; Hryszczynska, W.; Pawlak, Z.; Biskupek, H.; Machowski, S.; Rosiak, T.; Grzesiak, J.
Roczniki Panstwowego Zakladu Higieny 20 (2) 173-7 (1969) [18 ref. Pl, ru, en] [Zaklad Badania Zywnosci i Przedmiotow Uzytku, Panstwowy Zaklac Higieny, Warsaw, Poland]

No aflatoxin B_1 was detected by thin layer chromatography in 17 samples of Polish wheat, 2 samples of Soviet wheat or 26 samples of rice from the American continent, China, Egypt, Spain and Cambodia. The samples (⩾2 kg) were mainly from warehouses, and also from retail shops. SKK

9 S 592
Extraction and analysis of aflatoxins from cured and aged meats.
Bullerman, L. B.; Hartman, P. A.; Ayres, J. C.
Journal of the Association of Official Analytical Chemists 52 (3) 638-41 (1969) [15 ref. En] [Dept. of Dairy and Food Ind., St. Univ., Ames, Iowa 50010, USA]

A method is presented that is suitable for the analysis of aflatoxins in meats. Ham, bacon, salami, and fresh beef were treated with 4 levels of aflatoxin B_1 (0.25, 2.5, 25 and 250 μg/100 g meat) and aflatoxin G_1 (0.4, 4.0, 40 and 400 μg/100 g meat) and the toxins recovered by chloroform extraction. A silica gel column was used to partially purify the chloroform extract, when necessary, and the aflatoxin levels were quantiatively measured by visual comparison with aflatoxin standards on thin layer chromatography plates. Concn. of aflatoxin B_1 in meat as low as 2.5 parts/billion could be detected with this method. AS

9 S 665
Growth and aflatoxin production by selected aspergilli on cured and aged meats.
Bullerman, L. B.
Dissertation Abstracts, Section B 29 (9) 3355 (1969) [En] [St. Univ., Ames, Iowa, USA]

Of fungi isolated from cured and aged meats a strain of Aspergillus flavus from Italian-type salami produced aflatoxins, but none was produced by A. flavus-oryzae, ruber, wentii, niger or by Penicillium frequentans, variable or puberulum. Aflatoxin add[illegible]on to fresh beef, ham, bacon, salami were readil[illegible]tracted directly with $CHCl_3$ and could be parti[illegible] purified by silica gel column followed by t[illegible] layer chromatography for quantitative determi[illegible]n. Aflatoxins were produced on fresh beef tre[illegible]d with antibi

and on ham and bacon inoculated with toxigenic fungi and stored at 15, 20, and 30°C. One beef sample stored at 20°C produced 630 μg total aflatoxin/g of which 580 μg was aflatoxin G_1. At <30°C meats developed higher levels of aflatoxin G_1 than aflatoxin B_1, but at 30°C A. flavus produced equal amounts of G_1 and B_1, while A. parasiticus continued to produce more G_1. Temp. <15°C and humidities <75% prevented aflatoxin development during ageing salami and curing ingredients, especially pepper and NaNO$_2$, tended to reduce the amounts produced. At temp. approaching 30°C aflatoxins were produced on country cured hams after 6-9 months ageing. ELC

10 C 451

[Detection of aflatoxins in foods.] Nachweis von Aflatoxinen in Lebens- und Futtermitteln.

Frank, H. K.

Alimenta 8 (3) 67-69 (1969) [11 ref. De] [Bundesforschungsanstalt für Lebensmittelfrischhaltung, Engesserstrasse 20, D-75 Karlsruhe, W. Germany]

A chromatographic method for the detection of aflatoxins is described. The use of several developing solvents and sprays is recommended since other substances present in certain foods display the same chromatographic properties as aflatoxins. 8 developing solvents are named which should be used in a fixed sequence. FWJ

10 C 467

Improved procedures for measurement of aflatoxins with thin layer chromatography and flurometry.

Shih, C. N.; Marth, E. H.

Journal of Milk and Food Technology 32 (6) 213-17 (1969) [20 ref. En] [Dept. of Food Sci., Univ, Madison, Wisconsin 53706, USA]

Optimal resolution of aflatoxins B_1, B_2, G_1, and G_2 was obtained when thin layer Chromatoplates equipped with a 0.25 mm layer of silica gel (Adsorbosil-5) were used within 2 h after heat activation and when plates were developed in an unlined unequilibrated tank containing methanol and chloroform (1:99 v/v). Plates were further improved for fluorometric canning by extending the distance of the solvent front from 15 to 18 cm and by scoring the Adsorbosil-5 to provide narrow bands prior to spotting the sample. Chromatoplates treated as described were accurately scanned with a fluorometer and concentrations of aflatoxins were indicated by areas under peaks as drawn by an attached recorder. A satisfactory linear relationship was obtained between the emitted fluorescences expressed as the area under peaks and concentration of the 4 aflatoxins. AS

10 J 900

Subsampling mill for peanut kernels.

Dickens, J. W.; Satterwhite, J. B.

Food Technology (Champaign) 23 (7) 950-52 (1969) [4 ref. En] [St. Univ., Raleigh, [illegible] Carolina 27607, USA]

A simple, compact mill was developed to simultaneously comminute and subsample peanut kernels at the rate of ~3 kg/min. Comminution of peanut kernels was finer than with equipment presently used in many laboratories. Very little oil was expressed from the comminuted material which was easily blended and subdivided. Tests with samples containing known amounts of aflatoxin-contaminated kernels indicated that the subsampling accuracy of the mill is acceptable. Use of the mill is proposed for comminuting and susbampling a wide variety of granular materials for aflatoxin or other analyses. IFT

10 J 923

Destruction of aflatoxins in peanuts during dry and oil roasting.

Lee, L. S.; Cucullu, A. F.; Franz, A. O., Jr.; Pons, W. A., Jr.

Journal of Agricultural and Food Chemistry 17 (3) 451-53 (1969) [7 ref. En] [Southern Regional Res. Lab., New Orleans, Louisiana 70119, USA]

Blanched whole peanut kernels inoculated with a toxigenic strain of Aspergillus flavus and subjected to continuous shaking during incubation for 40, 46, 64 and 72 h produced peanuts virtually clear of visible mould and containing 4 graded levels of total aflatoxins - 130, 260, 2560, and 6300 parts/billion (μg/kg). Although individual kernels differed in aflatoxin content, replicate assays of 50-g aliquots of contaminated whole kernels were subjected to oil and dry roasting under 5 time-temp. conditions simulating those used in industry to effect a normal roast for high quality peanuts. Average reduction in aflatoxin content ranged from 45 to 83%, depending on roasting conditions and the level of toxins in the raw kernels. There was an over-all reduction of 65% in B_1, and 62% in G_1 for oil roasting, and 69% in B_1 and 67% in G_1 for dry roasting. The degree of reduction in aflatoxin content was greatest at the highest aflatoxin contamination levels, for both oil- and dry-roasted peanuts. AS

10 N 431

Relation of aflatoxins in cotton seeds at harvest to fluorescence in the fibre.

Marsh, P. B.; Simpson, M. E.; Ferretti, R. J.; Campbell, T. C.; Donoso, J.

Journal of Agricultural and Food Chemistry 17 (3) 462-67 (1969) [16 ref. En] [Crops Res. Division, Agric. Res. Service, Beltsville, Maryland 20705, USA]

In bulk samples of US cotton seed collected to represent all harvestable bolls, aflatoxins wer found infrequently and, when present, at very l levels. However, seeds from occasional individual bolls whose fibre exhibited an Aspergillus fla associated greenish yellow fluorescence contained variable but generally high levels of aflatoxin B_1. Seeds from visibly rotted bolls lacking th fluorescence also sometimes contained aflat[illegible] in B_1 but at a much lower average level. In lab. culture, 49 out of 50 isolates of A. fla [illegible] produced aflatoxin B_1, tl [illegible]

unrelated to the geographical origin of the culture, while other seed-invading field fungi produced little or no aflatoxins. All A. flavus isolates caused the greenish yellow fluoerscence in living cotton fibre, whereas no other field fungi tested did so. The fibre fluorescence, therefore, appears to offer promise as a preliminary screening test to locate seed scontaining high levels of aflatoxins at harvest. Penetration of A. flavus occurred through the chalazal end of the seed. AS

10 N 432

Mechanism of formation of a fluorescence in cotton fibre associated with aflatoxins in the seeds at harvest.

Marsh, P. B.; Simpson, M. E.; Ferretti, R. J.; Merola, G. V.; Donoso, J.; Craig, G. O.; Trucksess, M. W.; Work, P. S.

Journal of Agricultural and Food Chemistry 17 (3) 468-72 (1969) [13 ref. En] [Crops Res. Division, Agric. Res. Service, Beltsville, Maryland 20705, USA]

A bright greenish yellow fluorescence, observed previously in cotton fibres infected in the living state in the field and in the lab. with Aspergillus flavus, has now been produced experimentally in living tissues of several other plants that were mechanically injured and then incubated with the fungus. Evidence indicates that the fungus forms kojic acid, which is converted to the fluorescing substance under the influence of peroxidase in the plant. The relevance of these results to the use of the fluorescence to locate cotton seeds containing aflatoxins at harvest is discussed. [See preceding abstract] AS

11 C 478

[Production of aflatoxins in butter and margarine.] Aflatoxinbildung in Butter und Margarine.

Rehm, H.-J.; Schmidt, I.

Zeitschrift für Lebensmitteluntersuchung und Forschung 140 (3) 164-65 (1969) [6 ref. De, en] [Inst. für Lebensmittelchemie, Technische Hochschule, Munich, W. Germany]

20-g samples of butter and margarine were placed in sterile Petri dishes and inoculated with 1 ml of a conidial suspension of 1 of 3 strains of aflatoxin-producing Aspergillus flavus, and kept at room temp. Strain 19 (BI A Karlsruhe) produced medium growth with sporulation within 2 months in both butter and margarine; traces of aflatoxin (>0.0003 µg/g mycelial growth) were detected. The other 2 strains grew very poorly in butter and were not detected in margarine; 1 strain (Link 53 from CBS Baarn, The Netherlands) produ[illegible] .5 µg aflatoxin/g mycelial growth, but no [illegible] toxin pro[illegible] [illegible] other s[illegible] (Link 54 [illegible]). [illegible]

11 C 479

O-Alkyl derivatives of aflatoxins B_{2a} and G_{2a}.

Dutton, M. F.; Heathcote, J. G.

Chemistry and Industry 1969 (29) 983-36 (1969) [4 ref. En] [Dept. of Biochem., Univ., Salford M5 4WT, England]

An account is given of derivatives which may arise in cultures of Aspergillus flavus and during the extraction of the aflatoxins. These compounds may interfere with procedures for the assay of aflatoxins. JA

11 C 480

Conditions and techniques for thin layer chromatography of aflatoxins.

Nesheim, S.

Journal of the American Oil Chemists' Society 46 (6) 335-38 (1969) [10 ref. En] [Division of Food Chem. and Technology, Bureau of Sci., Food and Drug Administration, US Dept. of Health, Education and Welfare, Washington, DC 20204, USA]

Satisfactory resolution of the 4 common aflatoxins, B_1, B_2, G1 and G_2, on thin layer chromatograms has been a recurring problem. The most frequently observed cause of poor resolution and tailing of spots in the chromatograms was the variable properties of the commercial silica gel-calcium sulphate adsorbent preparations. Variations in quality were observed even from one container to the next within single lots produced by individual manufacturers. Other variables which affected the chromatography to some degree included adsorbent particle size, concn. and nature of the calcium sulphate binder, silica gel layer thickness and moisture content, vapour phase composition in the developing chamber and the solvent used for development. AS

11 C 481

Aflatoxins: Improved resolution by thin layer chromatography.

Stubblefield, R. D.; Shannon, G. M.; Shotwell, O. L.

Journal of the Association of Official Analytical Chemists 52 (4) 669-72 (1969) [7 ref. En] [Northern Regional Res. Lab., Peoria, Illinois 61604, USA]

Water was added to solvent systems for thin layer chromatography of aflatoxins to achieve more reproducible results in lab. where temp. and RH vary. Resolution of the toxins also improved. Increments of water were added to solvent systems composed of acetone-chloroform (10 + 90, 12 + 88 and 15 + 85, v/v). As the water concn. was increased, separation of aflatoxins B_2 and G_1 improved. These 2 toxins are usually the most difficult to resolve in these solvent systems. Separations were the best with water-acetone-chloroform (1.5 + 12 + 88, v/v/v). Water added to methanol-chloroform (3 + 97, v/v) improved resolution of this solvent system but not enough for quantitative analysis, or at times, qualitative analysis. The solvent system water-methanol-ether (1 + 3 + 96, v/v/v) separated aflatoxins as well as water-acetone-chloroform ([illegible] + 12 + 88, v/v/v). AS

11 C 482

Note on acetonitrile as an extracting solvent for aflatoxins.

Yin, L.

Journal of the Association of Official Analytical Chemists 52 (4) 880 (1969) [2 ref. En]

[Division of Food Chem. and Technology, Food and Drug Administration, Washington, DC 20204, USA]

Preliminary studies with acetonitrile indicate that this solvent may be sufficiently selective to eliminate or simplify the clean-up procedure when determining aflatoxins in feedstuffs. Some results with a cottonseed meal naturally contaminated with afltaoxins B_1 and B_2 are given. MEG

11 J 1016

Theoretical investigations into the accuracy of sampling shelled peanuts for aflatoxin.

Whitaker, T. B.; Wiser, E. H.

Journal of the American Oil Chemists' Society 46 (7) 377-79 (1969) [7 ref. En] [Biological and Agric. Engineering Dept., St. Univ., Raleigh, North Carolina 27607, USA]

Within a population of shelled peanuts, aflatoxin may be concentrated in <0.5% of the peanuts. Those peanuts containing aflatoxin might have concn. ⩽1 000 000 μg aflatoxin/kg of peanuts. Because of the distribution pattern, sample means vary widely, and the true average level of aflatoxin in the population is difficult to estimate. The objective of this study was to determine the effect of sample size on sampling accuracy. The negative binomial distribution was used to simulate the actual distribution of aflatoxin since it allowed for a high probability of zero counts along with small probabilities of large counts. Using both the Monte Carlo technique and a direct computation method, the effect of sample size on sampling accuracy was quantitaively described. AS

11 M 828

Market quality research.

Schroeder, H. W.; Stermer, R. A.; Boller, R. A; Beerwinkle, K. R.

Rice Journal 72 (7) 50-53 (1969) [13 ref. En]

[Market Quality Res. Division, Agric. Res. Service, USDA, Coll. Sta., Texas, USA]

⅔ of the Aspergillus flavus isolates from the 1966 rice crop studied were toxigenic, producing both B and G toxins, while only 20% of the isolates from the 1968 crop produced either toxin B or G, <1% produced both toxins. The toxin-producing potential of the most toxigenic 1968 strains was ~ 0.01% that of the 1966 isolates. Measurement of the degree of milling of rice by the Rice Ratiospect showed a high correlation with visual evaluation. Readings were, however, affected by the presence of abnormal rice. A study of the optical properties of red rice, heat-damaged rice and chalky rice showed that heat-damaged and red rice had spectral transmission characteristics very similar to those of brown rice. An Icore colour sorter was 95% efficient in separating dark heat-damaged rice, dark red rice and heavy chalky rice kernels from normal rice, and 50-70% efficient with light heat-damaged and light red-streaked kernels. An x-ray scanning method for detecting internal insect infestation at a rate of 36 kernels/min is being developed. RM

11 P 1108

Determination of aflatoxin B1 and M1 in milk.

[Abstr. pap. read at ann. meeting Amer. Dairy Sci. Ass., June 1969]

Jacobson, W. C.; Harmeyer, W. C.; Wiseman, H. G.

Journal of Dairy Science 52 (6) 881 (1969) [En]

[Division of Vet. Res., Beltsville, Maryland, USA]

Milk was treated with 80% methanol to remove protein, the filtrate adjusted to 50% methanol by addition of 4% NaCl solution and fat removed by extraction with hexane. Aflatoxins were then extracted from the methanol phase with chloroform. The chloroform phase was treated with $CuCO_3$, the filtrate evaporated to dryness and the residue, dissolved in hexane-benzene (1:1), put onto a Celite column clad with aqueous $CaCl_2$ solution. Aflatoxin B1 was eluted with benzene-acetone (98:2) and aflatoxin M1 with benzene-chloroform (70:30). The 2 fractions were evaporated to dryness and the residues, in chloroform, were spotted on thin-layer chromatography plates for fluorescent comparisons. Complete recovery of aflatoxins B1 and M1 was obtained at 0.00025 ppm levels. HGO

12 P 1197

Modification of method for aflatoxins in milk.

Masri, M. S.; Page, J. R.; Garcia, V. C.

Journal of the Association of Official Analytical Chemists 52 (3) 641-43 (1969) [2 ref. En] [Western Regional Res. Lab., Albany, California 94710, USA]

The method described previously for aflatoxin M in milk [J. Ass. off. analyt. Chem. (1968) 51 (3) 594-600] was modified to simplify and shorten it. The freeze-dried milk samples are now extracted directly with methanol-[illegible] v/v), instead of being defatted with petrol ether and then extracted with methanol-[illegible] v/v), using 6 ml solvent mixture/g dried [illegible] resulting suspension is centrifuged, the aqueous [illegible] methanol solution filtered through Celite, and a portion extracted directly with chloroform, omitting the 2nd defatting previously employed. With these and other small [illegible] the [illegible] layer chromatographic separation. SJB

01 A 28

Report of the Joint AOAC-AOCS Aflatoxin Committee. [A report]

Fischbach, H.

Journal of the Association of Official Analytical Chemists 52 (5) 970-75 (1969) [31 ref. En] [Division of Pesticides, Food and Drug Administration, Washington, DC 20204, USA]

The Joint AOAC-AOCS Aflatoxin Committee, first proposed in 1964 and an active committee in 1965, coordinates methods development in the 2 societies. The history and accomplishments of this comittee are outlined and the areas of interest of the AOAC and the AOCS are defined. Since the committee's inception the following actions have been taken: AOAC has adopted 2 methods for peanuts and peanut products and a chemical derivative confirmation test as official final action and a method for cottonseed as official first action; the AOCS has adopted one of the above methods for peanuts and peanut products as a Tentative Method. The AOAC Associate Referee topics for aflatoxins are listed and the current status of research under these topics is described. AS

01 A 29

New solvent systems for thin-layer chromatography of aflatoxins.

Engstrom, G. W.

Journal of Chromatography 44 (1) 128-32 (1969) [21 ref. En] [Nat. Animal Disease Lab., Animal Disease and Parasite Res. Division, Agric. Res. Service, USDA, Ames, Iowa 50010, USA]

3 new solvent systems have been developed for the thin-layer chromatography (TLC) of aflatoxins B_1, B_2, G_1, and G_2. Solvent system 'A' is an analytical adsorption chromatography system which changes the usual resolved sequence of aflatoxins to B_1, G_1, B_2 and G_2. Solvent 'B' is a liquid partition chromatography system which is very good analytically and has the resolution needed to make its use for preparative TLC practical. The third TLC solvent system, 'C', is an adsorption chromatography system which is excellent both analytically and preparatively. Solvent system 'C' requires 2 developments or 3 h of continuous development to give the max. degree of resolution. AS

01 A 30

Note on adsorption of aflatoxin standards to glass.

Rodricks, J. V.

Journal of the Association of Official Analytical Chemists 52 (5) 97[illegible] (1969) [[illegible] ref. En] [Division of Food Chemistry and Technology, Food and Drug Administration, Washington, DC 20204, USA]

Aflatoxins deposited as dry films on glass vials [illegible] adsorbed to the surface and are not completely [illegible]ered by the addition of solvent. The [illegible]ntrations of solutions prepared from [illegible] [illegible]t be determined by UV absorptivity. [illegible] AS

01 A 47

Interference of ethoxyquin in the thin-layer chromatographic estimation of aflatoxin.

Stefaniak, B.

Journal of Chromatography 44 (2) 403-06 (1969) [14 ref. En] [Dept. of Pharmacology and Toxicology, Vet. Res. Inst. Pulawy, Poland]

Rf values for 4 samples of commercial grade ethoxyquin, used as an antioxidant in certain foods, were compared with that of aflatoxin B_1 on thin-layer chromatography. Three types of plates and 10 different solvent systems were used. Examination of the plates showed that the aflatoxin-like blue fluorescence was not due to ethoxyquin but to unidentified impurities present in it. Aflatoxin fluorescence could be distinguished from that of the impurities by a second development of the plates in ethyl ether followed by spraying with 5% nitric acid, when the fluorescence of aflatoxin B_1 changed to yellow while that of the ethoxyquin impurities was unchanged. A method is described for removing the interfering fluorescent compounds during the column clean-up of food samples to be analysed for aflatoxin contamination but that contain added ethoxyquin. MEG

01 C 12

Detection of toxicity of aflatoxins, sterigmatocystin, and other fungal toxins by lethal action on zebra fish larvae.

Abedi, Z. H.; Scott, P. M.

Journal of the Association of Official Analytical Chemists 52 (5) 963-69 (1969) [49 ref. En] [Res. Lab., Food and Drug Directorate, Dept. of Nat. Health and Welfare, Ottawa, Ontario, Canada]

The effects of 13 fungal toxins (and one derivative) on the larvae of zebra fish, Brachydanio rerio (Hamilton-Buchanan), were investigated. The most toxic were sterigmatocystin, gliotoxin, and aflatoxin B_1, which were lethal at concn. of <1 μg/ml. Aflatoxins B_2, G_1, and G_2, stemphone, diacetoxyscirpenol, ochratoxin A, aspertoxin, and patulin also showed toxicity to the larvae, while aflatoxin B_1 hemiacetal, penicillic acid, and griseofulvin were non-toxic at the levels tested. Specific morphological effects were noted with sterigmatocystin, aflatoxins, and stemphone. The usefulness of zebra fish larvae as bioassay test organisms for fungal toxins is discussed. [See also FSTA (1969) 1 1C4.] AS

01 M 54

Toxins from mouldy cereals. [A review]

Bamburg, J. R.; Strong, F. M.; Smalley, E. B.

Journal of Agricultural and Food Chemistry 17 (3) 443-5[illegible] (1969) [[illegible]1 ref. En] [Dept. of Biochem. Univ., Madison, Wisconsin 53706, USA]

The emphasis of this review is placed on foods and feeds and the chemical nature and biological effects of mycotoxins that may be contained therein. A table gives the structure and toxicity of mycotoxins from fungi associated with cereal grains. Diseases discussed in detail are alimentary toxic aleukia, yellow rice toxicosis, vulvo-vaginitis in swine, epidemic polyuria, fungal nephrotoxcity in swine and mouldy corn toxicosis. JA

01 P 74
The total synthesis of racemic aflatoxin-M_1 (milk toxin).
Büchi, G.; Weinreb, S. M.
Journal of the American Chemical Society 91 (19) 5408-09 (1969) [15 ref. En] [Dept. of Chem., Inst. of Technology, Cambridge, Massachusetts 02139, USA]

A method for synthesizing racemic aflatoxin-M_1 (hydroxyaflatoxin-B_1), starting from 4,6-dihydroxycoumaran-3-one, is described. The synthetic compound was compared with the natural optically active aflatoxin-M_1 and was found to have similar infrared, UV and mass spectra and to behave similarly on thin-layer chromatography. MEG

01 P 107
Aflatoxins not recovered from commercial mould-ripened cheeses.
Shih, C. N.; Marth, E. H.
Journal of Dairy Science 52 (10) 1681-82 (1969) [9 ref. En] [Dept. of Food Sci., Univ., Madison, Wisconsin 53706, USA]

Using the thin-layer chromatographic method of Shih and Marth [FSTA (1969) 1 10C467] aflatoxins were not detected in extracts of 5 samples (representing 4 brands) of domestic Blue cheese, 2 samples (2 brands) of Roquefort cheese or 3 samples (1 foreign and 2 domestic brands) of Camembert cheese obtained from local supermarkets. CDA

2 B 9
Microbiological problems in food preservation by irradiation. [Conference proceedings]
Food and Agriculture Organization of the United Nations; International Atomic Energy Agency
148pp. (1967) [Numerous ref. En] Vienna: Int. Atomic Energy Agency. Price 21s. 6d. [Rome, Italy]

The proceedings of a panel organized by the Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture and held in Vienna 27th June-1st July 1966, are reported. Papers include: 'The inactivation of infection and intoxication micro-organisms by irradiation in seafood', by D. J. Quinn, A. W. Anderson & J. F. Dyer (pp. 1-13, 9 ref.); 'The effect of ionizing radiation on Clostridium botulinum spores', by N. N. Masokhina-Proshnyakova & G. V. Ladukhina (pp. 27-35, 12 ref.); 'Toxin production by Cl. botulinum type E in fish', by G. Hobbs (pp. 37-44, 21 ref.); 'Radiosensitivity of type E botulinus toxin and its protection by proteins, nucleic acids and some related substances', by T. Miura, S. Sakaguchi, G. Sakaguchi & K. Miyaki (pp. 45-54, 7 ref.); 'Radiation resistance of botulinal toxins', by T. A. Roberts (pp. 55-56, 5 ref.); 'Resistance of aflatoxin to chemical and biological changes by gamma irradiation', by K. Miyaki, K. Aibara & T. Miura (pp. 57-64, 2 ref.); 'The effects of additives on radiation resistance of Cl. botulinum in meat', by A. W. Anderson, D. A. Corlett, Jr. & K. L. Krabbenhoft (pp. 87-97, 14 ref.); 'Combination treatment of spores of Cl. botulinum with heat plus radiation', by N. Grecz, J. Upadhyay, T. C. Tang & C. A. Lin (pp. 99-113, 13 ref.); 'Effects of heating and gamma radiation on the inhibition of bacterial spores by curing agents', by T. A. Roberts (pp. 115-21, 7 ref.); 'Reduction of radiation dose requirements of foods by additives', by J. Farkas, I. Kiss & E. Andrassy (pp. 123-31, 32 ref.); 'The effect of ionizing radiation and antioxidant treatment on the quality and storage life of vacuum-packed trout at 0°C', by P. Hansen & B. V. Jorgensen (pp. 133-38, 10 ref.). Summaries, conclusions and reccommendations of the panel are listed at the end of the text. VJG

2 C 24
Toxicity of aflatoxins to Bacillus megaterium.
Viitasalo, L.; Gyllenberg, H. G.
Lebensmittel Wissenschaft und Technologie 2 (5) 113-14 (1969) [7 ref. En, de, fr] [Dept. of Nutrition, Univ., Helsinki 71, Finland]

A microbiological method for measuring aflatoxins B_1, B_2, G_1 and G_2 in foodstuffs is described. Growth inhibition of B. megaterium was proportional to the amount of aflatoxin present in the medium. For complete suppression of growth, the amounts of aflatoxin required/ml of medium were: B_1 100 µg, B_2 250 µg, G_1 200 µg and G_2 250 µg. This order of toxicity is similar to that found in animals. MEG

2 C 36
Natural food poisons.
Campbell, A. D.
Food Technology in Australia 21 (9) 460-61 & 463 (1969) [En]

This article describes mainly the work of the US Food and Drug Administration in developing analytical methods for the detection of aflatoxins and other mycotoxins in foodstuffs. MEG

[Studies of aflatoxin B_1 and its behaviour [illegible] food processing.] Untersuchungen [illegible] und Wanderung von Aflatoxin B [illegible] Veränderungen bei einigen lebensmitteltechnologischen Prozessen
Hanssen, E.; Hagedorn, G.
Zeitschrift für Lebensmitteluntersuchung und Forschung 141 (3) 129-45 (1969) [64 ref. D [illegible]
[Laboratorien der H. Bahlsens Keksfabrik, Hannover, W. Germany]

In studies of the occurence and behaviour of aflatoxin B_1, the thin layer chromatographic method of van der Linde (Rijks Inst. voor de Volksgozondheit, Utrecht, Netherlands) was used. In various mouldy foods (hazelnut, nutmeg, frying fat, apple, orange, peach, lemon, pickled cucumber, white bread, whole-rye bread) 5-140 μg/kg aflatoxin B_1 was found. Expt. with coconut, honeycake and whole-rye bread showed a quick migration of aflatoxin B_1 from the infected areas to intact food parts in a few days. In whole-rye bread, 45 000 μg/kg aflatoxin B_1 was found 7 cm below the mycelium. Airborne Aspergillus flavus spores also contain aflatoxin B_1, a possible contamination hazard during food processing. Aflatoxin B_1 is extremely resistant to heat. Groundnut oil infected expt. with 500 μg/kg aflatoxin B_1 still contained 400 μg/kg after heat treatment at 160°C for 60 min. Cows and sheep consuming feed containing aflatoxin B_1 gave milk containing aflatoxins M_1 and M_2 (metabolites of B_1) which could not be destroyed by flash pasteurization at 72-77°C or by holder pasteurization at 63-66°C for 30 min. Meals from aflatoxin-containing oilseeds contain ~95% of initial aflatoxin contents. Eggs from hens and meat from cattle fed with aflatoxin-containing feed did not contain any aflatoxin. Neither of the known detoxication procedures has so far been found efficient in removing aflatoxins from contaminated foods. IF

2 C 44

Biosynthesis of aflatoxins by cell-free preparations from Aspergillus flavus.

Raj, H. G.; Viswanathan, L.; Murthy, H. S. R.; Venkitasubramanian, T. A.

Experientia 25 (11) 1141-42 (1969) [8 ref. En] [Vallabhbhai Patel Chest Inst., Univ., Delhi, India]

2 C 45

Studies of long term administration of aflatoxin to rats as a natural food contaminant.

Alfin-Slater, R. B.; Aftergood, L.; Hernandez, H. J.; Stern, E.; Melnick, D.

Journal of the American Oil Chemists' Society 46 (9) 493-97 (1969) [19 ref. En] [School of Public Health, Univ., Los Angeles, California 90024, USA]

3 groups of rats were fed diets containing 0, 0.001 or 0.01 ppm aflatoxin (A), mainly the B_1 form, for 4 generations, with rats of the 1st and 4th generations receiving the diets for 104 wk. The diets each contained 35% groundnut butter; the required A content was obtained by using the [illegible] contaminated groundnuts. Also, 2 [illegible] of rats were fed diets containing 0 and [illegible] A for 12, 18 and 21 months. Rats fed [illegible] those on the A-free diet, and organ wt. and liver [illegible] lipid and cholesterol levels were comparable. Liver abnormalities in some cases, e.g. haemorrhagic and opaque spots and mottling, were attributed to ageing since they appear in control and expt. groups. In rats fed the diet with 0.08 ppm A there were liver involvement and biochemical changes not found in controls, but no hepatomas were observed even after 21 months. SJP

3 H 377

Collaborative study on a method for detection of aflatoxin B_1 in green coffee beans.

Levi, C. P.

Journal of the Association of Official Analytical Chemists 52 (6) 1300-03 (1969) [5 ref. En] [General Foods Corp., Technical Center, White Plains, New York 10602, USA]

9 laboratories collaboratively studied a method [J. Ass. off. analyt. Chem. (1968) **51**: 609] for the detection of aflatoxin B_1 in green coffee beans. The method investigated incorporates a Florisil column cleanup step, followed by visual estimation of aflatoxin. The method is recommended for adoption as official first action for semiquantitative determination of aflatoxin B_1. Further study is required on the Florisil cleanup step. AS

3 M 219

Estimation of aflatoxin in corn by "dockage" assay.

Johnson, R. M.; Greenaway, W. T.; Dolan, W. P.

Journal of the Association of Official Analytical Chemists 52 (6) 1304-06 (1969) [7 ref. En] [Market Quality Res. Division, Agric. Res. Service, USDA, Beltsville, Maryland 20705, USA]

A method of analysing corn for aflatoxin was developed by assaying only the broken corn, foreign material, and chaff (dockage). Only 1 out of 21 commercial ground corn samples to which corn containing aflatoxin was added gave positive results for aflatoxin. On the other hand, all "dockage" portions sieved from these same samples gave positive results. The procedure consists of streaking corn extracts on preparative coated sheets for cleanup, separation, and identification. If quantitative results are desired, fluorescent areas rae collected and spotted on thin layer chromatography plates for identification under UV light. AS

4 C 90

[A fluorimetric method for the determination of aflatoxin in feedstuffs.] Eine fluorimetrische Methode zur Bestimmung von Aflatoxin in Futtermitteln.

Ranfft, K.

Landwirtschaftliche Forschung 22 (2) 130-35 (1969) [26 ref. De, en, fr] [Bayerische Hauptversuchsanstalt für Landwirtschaft, Freising-Weihenstephan, W. Germany]

The fluorimetric method described, which permits determination of aflatoxin in the range 0.01-1 μg/kg, should also be applicable to foods as well as feedstuffs. The method consists of extracting aflatoxin as previously described [Landw. Forsch. (1968) 21: 164], followed by chromatographic purification on a silica gel column. The purified, evaporated extract is redissolved in CH_2Cl and further separated by thin layer chromatography on silica gel, using chloroform:methanol (97:3) as developing solvent. The aflatoxin spots are then scraped off, desorbed by elution with chloroform and the amount determined by measuring the fluorescence at 425 nm for aflatoxin B_1 and at 450 nm for aflatoxin G_1. FWI

4 C 95
Aflatoxin production by some Indian strains of Aspergillus flavus Link ex Fries.
Maggon, K. K.; Viswanathan, L.; Venkitasubramanian, T. A.
Journal of General Microbiology 59 (1) 119-24 (1969) [17 ref. En] [Dept. of Biochem., Vallabhbhai Patel Chest Inst., Univ., Delhi-7, India]

9 strains of Aspergillus flavus and one each of A. versicolor, A. penicilliformis and A. niger isolated from Delhi soils were screened for ability to produce aflatoxins on different media. 7 strains of A. flavus produced aflatoxins B_1 and B_2 but no aflatoxin G. The other 5 isolates produced no detectable aflatoxins. Yields of aflatoxins were low on glucose-salts or sucrose-yeast extract media. The latter with added salts or a modified Czapek agar medium gave enhanced yields. AS

4 C 101
The analysis of foods for aflatoxins and other fungal toxins. A review. [A review]
Scott, P. M.
Canadian Institute of Food Technology Journal 2 (4) 173-77 (1969) [98 ref. En] [Food & Drug Directorate, Ottawa, Ontario, Canada]

4 C 105
The separation and detection of several mycotoxins by thin-layer chromatography.
Steyn, P. S.
Journal of Chromatography 45 (3/4) 473-75 (1969) [17 ref. En] [Nat. Chemical Res. Lab., CSIR, Pretoria, R. of S. Africa]

A method for the simultaneous separation and detection of aspertoxin, ochratoxins A and B, secalonic acid D, 8 α-(3-methylbutylryloxy)-4β, 15-diacetoxyscirp-9-en-3α-ol, aflatoxins B_1 and G_1, 6-hydroxyrosenonolactone, cyclopiazonic acid, zearalenone and sterigmatocystin, using plates of Silica Gel G impregnated with oxalic acid. The developing solvent was chloroform:methylisobutylketone (4:1). The mycotoxins are detected by exposure to UV light or by spraying with conc. H_2SO_4 and heating at 110°C for 10 min or with 1% ethanolic $FeCl_3$. MFG

4 J 374
Peanut butter's qualities can be assets to candies.
Maselli, J. A.
Manufacturing Confectioner 49 (10) 33-38 (1969) [En] [Oz Food Corp., Chicago, Illinois, USA]

Increasing usage of shelled peanuts in various foods in America is illustrated by consumption figures for 1958 and 1967 respectively (in million lb.): confections 137, 216; peanut butter 358, 480; salted peanuts 171, 233; peanut butter sandwiches 16, 22; other uses 13, 17; total usage 695, 968. The following topics are considered: peanut types, peanut growing areas, type of roasting employed, demand for split and granulated peanuts, composition and manufacture of peanut butter, presence of aflatoxin in peanuts, and storage and use of peanut butter and peanuts. A brief summary of some of the important specifications for peanut butter: roast colour, particle size, hardness, stability to oil leakage, and flavour stability, is given. VJG

4 M 262
Survey of cereal grains and soybeans for the presence of aflatoxin. I. Wheat, grain sorghum, and oats.
Shotwell, O. L.; Hesseltine, C. W.; Burmeister, H. R.; Kwolek, W. F.; Shannon, G. M.; Hall, H. H.
Cereal Chemistry 46 (5) 446-54 (1969) [10 ref. En] [Northern Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

A total of 531 wheat samples, 533 grain sorghum samples, and 304 oat samples, representing all marketing grades, were analysed for the presence of aflatoxin. Samples were extracted by the procedure, slightly modified, developed by the Food and Drug Administration for the analysis of peanut and peanut products. Extracts were assayed for the presence of aflatoxins by thin-layer chromatography (TLC). The sensitivity limit of the analysis as carried out was 2-5 parts/billion of the metabolite. According to results of TLC, 2 wheat samples, 6 grain sorghum samples, and 3 oat samples, all in poorer grades, appeared to contain low levels of aflatoxin (2-19 parts/billion). Samples that were positive by TLC were tested in ducklings. No aflatoxin-like activity was detected in grain sorghum samples. Although the duckling test indicated that traces of toxins might be present in wheat and oat samples, more likely the test was negative. The sensitivity of the test as conducted was 1-2 parts/billion. AS

4 M 263
Survey of cereal grains and soybeans for the presence of aflatoxin. II. Corn and soybeans.
Shotwell, O. L.; Hesseltine, C. W.; Burmeister, H. R.; Kwolek, W. F.; Shannon, G. M.; Hall, H. H.
Cereal Chemistry 46 (5) 454-63 (1969) [12 ref. En]

A total of 1311 corn samples and 866 soybean samples, including samples from all grades and 2 different crop years, 1964 and 1965, were assayed for the presence of aflatoxin. San[illegible] extracted by the procedure used in the survey of wheat, grain sorghum and oat samples, an[illegible] were tested for the presence of aflatoxin by thin-layer chromatography (TLC). The sensitivity limit of the analysis as carried out was 2-5 parts/billion of the metabolite. Of the 35 corn samples that were positive by TLC, 30 gave aflatoxin-like responses in ducklings. 5 of these were in grade 5, and 25 were in sample grade. 2 of the 866 soybean samples tested contained aflatoxin by TLC and the duckling test. Th[illegible] were in sampl[illegible]

4 M 332
[Studies concerning the occurrence of aflatoxin producers and aflatoxins in bread.] Studien zur Frage des Vorkommens von Aflatoxinbildner und Aflatoxin auf Brot.
Spicher, G.
Brot und Gebäck 23 (8) 149-52 (1969) [De]

91 mouldy samples of various types of bread were examined for aflatoxins by thin layer chromatography. Aflatoxins were found in 16.4% of the samples, especially in mixed bread, i.e. that containing both rye and wheat flours (25.4% of mixed bread samples contained aflatoxins). So far aflatoxins have been found only in mouldy bread, which would not be eaten. IN

4 S 272
Aflatoxin production in meats. I. Stored meats.
Bullerman, L. B.; Hartman, P. A.; Ayres, J. C.
Applied Microbiology 18 (5) 714-17 (1969) [16 ref. En] [Dept. of Food Technology, St. Univ., Ames, Iowa 50010, USA]

Aflatoxins were produced on fresh beef (in which bacterial spoilage was delayed with antibiotics), ham and bacon inoculated with toxinogenic fungi [2 strains of Aspergillus parasiticus and 1 of A. flavus] and stored at 15°, 20° and 30°C. Meats stored at 10°C were spoiled by bacteria and yeast before detectable levels of aflatoxins were produced. High levels of aflatoxins were formed in meats stored at 20°C; one sample supported the production of 630 µg of aflatoxins/g of meat, the major portion (580 µg) of which was aflatoxin G_1. Meats stored below 30°C developed higher levels of aflatoxin G_1 than B_1, but at 30°C A. flavus produced equal amounts of B_1 and G_1, whereas A. parasiticus continued to produce more G_1 than B_1. AS

4 S 273
Aflatoxins production in meats. II. Aged dry salamis and aged country cured hams.
Bullerman, L. B.; Hartman, P. A.; Ayres, J. C.
Applied Microbiology 18 (5) 718-22 (1969) [8 ref. En]

Italian-type salamis contaminated with Aspergillus flavus were more likely to develop aflatoxins during ageing than were smoked Hungarian-type salamis under the same conditions. Temp. of <15°C and humidities of <75% were found to prevent aflatoxin development during the ageing of salami. The ageing of salami for 8 wk and the presence of curing ingredients, especially pepper and sodium nitrite, tended to reduce the amounts of aflatoxins found. Aflatoxins were produced by A. flavus and A. parasiticus on 6- to 9-month-old country cured hams during ageing when the temp. approached 30°C. AS

5 C 111
[The mycotoxins.] [A review]
Hesseltine, C. W.
Industries d'Alimentation Animale 1969 (208) 25, 27, 29-31, 33, 35, 37, 39, 41, 43 (1969) [33 ref. Fr] [Northern Regional Res. Lab., Peoria, Illinois, USA]

The main characteristics of mycotoxins (substrates, optimum formation conditions, effects, chemical composition) are discussed and tabulated. Biological effects of aflatoxins are discussed on the basis of literature data. II

5 C 112
[The frequency of occurrence of aflatoxins and Aspergillus in food.]
Boutibonnes, P.; Jacquet, J.
Comptes Rendus des Seances de la Societe de Biologie 163 (5) 1119-24 (1969) [8 ref. Fr] [Lab. de Microbiologie, Faculte des Sci., Esplanade de la Paix, 14-Caen, France]

Animal and human foods were analysed for Aspergillus spores, mould and toxin. Spores of Asp. flavus were found predominantly in flour, peanuts, pistachio nuts, and frozen cod; Asp. niger in millet, peanuts, pistachio nuts, dates, coffee and cocoa; Asp. glaucus in wheat, peanuts, cocoa and dried milk; Asp. terreus in dried milk; Asp. repens in noodles; and Asp. clavatus, Asp. fumigatus and Asp. versicolor in frozen cod. Aspergillus mould was found on bread (Asp. ornatus, niger, flavus, glaucus, versicolor and sydowi), noodles (Asp. versicolor), ham (Asp. glaucus), celery (Asp. terreus), carrots (Asp. flavus), lemons (Asp. niger), pomegranates (Asp. flavus), prunes (Asp. ruber) and preserves (Asp. glaucus, medius and restrictus). Aspergillus was rarely detected in dairy products. There appeared to be no relationship between the presence of spores or mould and toxin. Of 200 varieties of Asp. flavus studied, 46 and 23%, respectively, of those from hot regions and European countries produced toxin. The results showed that animal health was more at risk than human health by the presence of toxins in foods. MPH

5 C 124
[Toxicological aspects of food additives.]
Logten, M. J. van
Chemisch Weekblad 66 (4) 26-31 (1970) [14 ref. Nl]

This basic article discusses acute, sub-acute, semi-chronic and chronic toxicity, acceptable daily intakes, no effect levels, and toxicity tests. Various aspects of the toxicology of food additives are illustrated by reference to pesticides and aflatoxins. MDB

5 C 125
[Poisoning from moulds in foods.] Gifte von Schimmelpilzen in Lebensmitteln.
Frank, H. K.
Verbraucherdienst B 14 (4) 73-75 (1969) [De]
[Inst. für Physik und Biologie, Bundesforschungsanstalt fur Lebensmittelfrischhaltung, Karlsruhe, W. Germany

To prevent mycotoxin poisoning from moulds w develop on foods, a control system is being set up in W. Germany, to implement the sensitive and rapid analytical methods available. It is pointed out that aflatoxins have not been isolated from even heavily mould-contaminated home-mad jams, and that aflatoxin-forming strains could not be cultivated on these jams. IN

5 C 126
review]

Mycotoxins: methods for detection in foods. [A review]

Ayres, J. C.; Lillard, H. S.; Lillard, D. A.
Food Technology 24 (2) 161-64 & 166 (1970) [Numerous ref. En] [Univ., Athens, Georgia 30601, USA]

The applicability and value of screening, presumptive and confirmatory tests in analysis of foods for the presence of mycotoxins (with emphasis on aflatoxins) are reviewed. Use of both physicochemical tests and bioassays remains necessary to prove contamination. IFT

5 C 128

Rapid chemical confirmatory method for aflatoxin B_1. I. Development of the method.

Pohland, A. E.; Yin, L.; Dantzman, J. G.
Journal of the Association of Official Analytical Chemists 53 (1) 101-02 (1970) [6 ref. En] [Division of Food Chem. and Technology, Food and Drug Administration, Washington, DC 20204, USA]

A revised method has been developed for the formation of aflatoxin B_1 derivatives for chemical confirmation. The method involves treating the aflatoxin-containing extract with conc. HCl and water to yield the water adduct and with conc. HCl and acetic anhydride to yield the epimeric acetates. The method is considered simpler to perform and produces fewer side reactions than the AOAC official final action method. [See following abstr.] AS

5 C 129

Rapid chemical confirmatory method for aflatoxin B_1. II. Collaborative study.

Stoloff, L.
Journal of the Association of Official Analytical Chemists 53 (1) 102-04 (1970) [4 ref. En]

A revised method for the preparation of aflatoxin B_1 derivatives for chemical confirmation has been compared with the AOAC official final action method in a collaborative study, using thin layer chromatographically-pure aflatoxin B_1 isolated by individual collaborators from peanut butter, peanut meal, and corn. The study showed that the revised method is simpler, shorter, and more reliable than the official method. It is recommended for adoption as an official first action alternative to the preparation and observation portions of the official final action method. [See preceding abstr.] AS

5 J 430

Studies on the microflora, aflatoxin, and p-aminobenzoic acid content of peanut fruits from Mexico and the influence of selected gases on aflatoxin production in peanuts by Aspergillus flavus Link.

Arnold, W. R.
Dissertation Abstracts International. Section B. The Sciences and Engineering 30 (3) 930 (1969) [En] [A & M Univ., College Station, Texas, USA]

Peanut kernels, with moisture contents from 5.7-48.9%, were inoculated with A. flavus and incubated for 9 days at 25°C under (i) compressed air, (ii) 2-aminobutane, (iii) N_2 or (iv) 87% CO_2 and 13% N_2. (i) and (iv) permitted aflatoxin production in kernels with moisture contents of 32.8 and 25.4%. Kernels stored under (ii) absorbed the chemical and under (iii) developed offensive odours. The p-aminobenzoic acid content of 15 varieties of peanuts ranged from 0.5-15 μg/g. Fusarium spp. predominated in the freshly harvested peanuts; after storage, fungi of the Aspergillus glaucus group were more commonly isolated. MEG

5 J 458

Sample preparation for aflatoxin assay: the nature of the problem and approaches to a solution.

Stoloff, L.; Campbell, A. D.; Beckwith, A. C.; Nesheim, S.; Winbush, J. S., Jr.; Fordham, O. M., Jr.
Journal of the American Oil Chemists' Society 46 (12) 678-84 (1969) [8 ref. En] [Bureau of Sci., Food and Drug Administration, US Dept. of Health, Education, and Welfare, Washington, DC 20204, USA]

Cases have been reported of individual peanuts, cottonseeds or Brazil nuts so highly contaminated with aflatoxin that, for a 50 g portion to be representative, the sample preparation procedures should grind each unit to a large number of particles and distribute them uniformly throughout the sample. Assuming uniform contamination of the individual kernel, each 50 g sample should contain 1/100 of that kernel. Even though these extreme cases may be encountered only infrequently, the more usual situation still presents difficulties because of great variability in individual kernel contamination. However, if the extreme can be handled, one can expect to handle the more usual situation. Equipment and procedures to achieve this distribution goal are described. The equipment studied includes a food chopper (Hobart), a nut mill (Thomas Mills), a disc mill (Bauer), a hammer mill (Fitzpatrick Model D comminuting machine), a hammer mill designed specifically for peanut samples (Dicken's subsampling mill), a Polytron homogenizer (Bronwill Scientific), a vertical cutter-mixer (Hobart), and a sample splitter (Jones riffle). Commodities examined were shelled peanuts and in-shell Brazil nuts, walnuts, pecans and almonds. Comminution and mixing were determined by particle size analysis, by distribution of kernels ma radioactive by neutron activ

analysis of naturally contaminated products. From the results it is concluded that the ultimate in sample uniformity can be achieved with a disc mill, solvent addition to obtain a fluid system and mixing and grinding of the fluid with a dispersion mixer-grinder. A practical uniformity can be achieved in a vertical cutter-mixer with less expenditure of time and effort for the commodities studied. AS

5 J 461

A study of the variability associated with sampling peanuts for aflatoxin.

Tiemstra, P. J.

Journal of the American Oil Chemists' Society 46 (12) 667-72 (1969) [9 ref. En] [Swift Grocery Products Co., Chicago, Illinois 60604, USA]

One lot of peanuts known to contain aflatoxin was extensively sampled to study the sources of variability. A nested design was used where sections (50 bag units), subsamples and analytical variation were the variables studied. Sample size was the most critical factor in characterizing this lot. Variability from section to section was not significant indicating random distribution of the contaminant. Three 20 lb samples were taken on a number of lots from the 1968 crop, each of which was subdivided into 2 equivalent subsamples. The aflatoxin was determined on each of these subsamples. The results indicated that all the significant variation came from the subsamples, further enforcing the thesis that sample size is the critical factor in variability, and not lot inhomogeneity. Analysis of 550 lots from the 1967 crop where triple samples and analysis were available indicates that the magnitude of the variability is a little greater than was found on the experimental lot. Using the pooled SD of the 1967 crop data, operating characteristic curves were plotted to demonstrate the improvement that can be expected by increasing the sample size. AS

5 J 539

Collaborative study of three methods for determination of aflatoxin in peanuts and peanut products.

Waltking, A. E.

Journal of the Association of Official Analytical Chemists 53 (1) 104-13 (1970) [14 ref. En] [Res. Lab. of Best Foods Division, CPC Int. Inc., Bayonne, New Jersey 07002, USA]

A collaborative study directly comparing the proposed BF method with the 2 AOAC offical 1st action methods for aflatoxin in peanut products (commonly designated as the CB and the Celite methods) was carried out on both naturally contaminated ground peanuts and specially prepared peanut butters, as well as commercial peanut butter and peanut meal to which known amounts of the aflatoxins were added. Included in the study were: comparisons of a proposed variation in the CB method; a study of silica gels used for the clean-up step of the CB method; comparison of the visual and instrumental evaluation of the TLC plates; and a spectrophotometric procedure for calibration of the standards. Statistical evaluation of the results indicated that no advantage was obtainable through the proposed revision in the CB method nor in the use of a common silica gel lot for the clean-up column. The standard calibration method was shown to be both accurate and precise and instrumental evaluations of the TLC plates were shown to be more precise than visual determinations. In addition to being faster and more convenient and requiring less reagents, the BF method was equal to the official methods with respect to between- and within- laboratory precision and accuracy. AS

5 P 642

Mycotoxins in ruminants.

Lancaster, M. C.

Proceedings of the Nutrition Society 28 (2) 203-12 (1969) [48 ref. En] [Nuffield Unit for Lab. Animal Pathology, Univ., Edinburgh, Scotland]

Diseases caused by ergot toxins from Claviceps purpurea, sporidesmin from Pithomyces chartarum and aflatoxin from Aspergillus flavus, their history and identification, are briefly reviewed and their biological effects in ruminants are considered. No residues have been detected in carcasses or milk of cattle fed ergot or sheep fed sporidesmin. The occurrence of residues of aflatoxin in carcasses and of its metabolite aflatoxin M_1 in milk of cows and sheep given large doses of aflatoxin B, is discussed with particular reference to public health. CDA

5 S 361

Country cured ham as a possible source of aflatoxin.

Strzelecki, E.; Lillard, H. S.; Ayres, J. C.

Applied Microbiology 18 (5) 938-39 (1969) [6 ref. En] [Food Sci. Dept., Univ., Athens, Georgia 30601, USA]

Of 10 fungi isolated from a heavily moulded country cured ham, 4 were identified as toxigenic strains of Aspergillus flavus. AS

6 B 41

The microbiology of dried foods. Proceedings of the Sixth International Symposium on Food Microbiology. [A symposium]

Kampelmacher, E. H.; Ingram, M.; Mossel, D. A. A. (International Association of Microbiological Societies, Committee on Food Microbiology and Hygiene) (Editors)

vii + 528pp. (1969) [Numerous ref. En] Bilthoven, The Netherlands: International Association of Microbiological Societies [Nat. Inst. of Public Health, Utrecht, The Netherlands]

Papers read at the symposium and discussions of the papers are presented. Titles are: 'Some technological aspects of the dehydration of food', by H. A. Leniger & S. Bruin (pp. 11-47); ['Microbiology of dehydrated foods; hygienic quality'], by R. Buttiaux & H. Beerens (pp. 48-66, 26 ref., Fr); 'The necessity for

resuscitation in examining dehydrated foods, especially for enteropathogenic and toxinogenic bacteria', by M. Woodbine, E. B. Reid & E. J. Rolfe (pp. 69-105, 88 ref.); 'Mechanisms concerned in the repair and recovery of sublethally impaired cells occurring in foods', by P. P. Lewicki & G. J. Silverman (pp. 106-34, 39 ref.); 'Ecological studies on the enrichment of Enterobacteriaceae occurring in dried foods in some currently used media', by D. A. A Mossel & H. M. Vincentie (pp. 135-64, 71 ref.); 'The significance of documented and suspected contaminations of dehydrated foods and feeds', by B. Q. Ward (pp. 167-77, 6 ref.) 'Fluorescent antibody techniques for the detection of Salmonella in dried foods', by D. L. Georgala & M. Boothroyd (pp. 178-92, 16 ref.); 'Comparative studies on the isolation of salmonellae from dry feed ingredients', by M. van Schothorst & E. H. Kampelmacher (pp. 193-209, 25 ref.); 'Detection and enumeration of staphylococci in foods', by G. Giolitti & C. Cantoni (pp. 210-21, 7 ref.); 'Staphyloenterotoxins in dried foods', by M. S. Bergdoll (pp. 225-42, 16 ref.); 'Enumeration of Clostridium perfringens in dried foods and feeding stuffs', by R. G. A. Sutton & B. C. Hobbs (pp. 243-78, 14 ref.); 'The significance of Bacillus cereus food poisoning in Hungary', by L. Ormay & T. Novotny (pp. 279-85, 10 ref.); 'Occurence, significance, and testing method for aflatoxins in dehydrated foods and feeds', by H. K. Frank (pp. 286-300, 20 ref.). [Continued infollowing abstr.] JA

6 C 140

[Documentation of mycotoxin literature. I. Aflatoxins.] Dokumentation der Mykotoxin-Literatur. I. Aflatoxine. [A review]

Meyer, H.; Leistner, L.

Archiv für Lebensmittelhygiene 20 (9) 203-06 (1969) [37 ref. De, en] [Bundesanstalt für Fleischforschung, Kulmbach, W. Germany]

6 C 141

Determination of aflatoxins in food by absorption spectrometry.

Agthe, C.; Lijinsky, W.; Oremus, D.

Food and Cosmetics Toxicology 6 (5) 627-31 (1968) [12 ref. En, fr, de] [World Health Organization, Avenue Appia, 1211 Geneva, Switzerland]

A method for the determination of aflatoxins B_1 and G_1 in lab. animal food is described. It involves extraction of the food with acetone and removal of interfering substances from the extract by chromatography on columns of silica gel, followed by thin layer chromatography on silicic acid. The separated aflatoxins B_1 and G_1 are estimated spectrophotometrically. Recoveries of added aflatoxins ranged from 57 to 93% for a 50-g sample containing 0.6 ppm and from 40 to 67% for a 1 kg sample containing 0.03 ppm. The latter was considered the lowest level of aflatoxin that could be reliably estimated. The method was not rapid, taking $\sim$2 days, but recoveries were reliable since absorption measurements are not subject to interference as are measurements of fluorescence intensity or the size of fluorescent spots. VJG

6 J 613

Aflatoxigenic isolates of Aspergillus flavus from pecans.

Lillard, H. S.; Hanlin, R. T.; Lillard, D. A.

Applied Microbiology 19 (1) 128-130 (1970) [10 ref. En] [Dept. of Food Sci., Univ., Athens, Georgia 30601, USA]

A study was made of the frequency and toxigenic potential of Aspergillus flavus from pecans used in bakery products. Of 120 colonies isolated and identified, 85 were shown to produce aflatoxin on yeast extract-sucrose medium. Extracts from mouldy raw pecan sections showed aflatoxin-like spots on thin-layer chromatography. Cooked pecans inoculated with toxigenic isolates of A. flavus were also good substrates for aflatoxin production. In view of the known carcinogenicity of aflatoxin, the presence of these compounds in market pecans presents a potential health hazard. HSi

6 L 350

Determination of aflatoxins in mouldy sugar beet pulp.

Teng, J. I.; Hanzas, P. C.

Journal of the American Society of Sugar Beet Technologists 15 (5) 438-43 (1969) [7 ref. En] [America Crystal Sugar Co., Rocky Ford, Colorado 81067, USA]

A rapid quantitative method for determining aflatoxins in mouldy sugar beet pulp is described. It consists of a modification of the extraction procedure of Eppley [J. Ass. Off. analyt. Chem. (1969) 49 1218-23], a proposed thin layer chromatographic clean-up with anhydrous ethyl ether-acetone, 98 : 2, v/v and a new-developing solvent, chloroform : acetone : n-hexane (85 : 15 : 20, v/v). Recovery tests gave 79.0-93.7% for aflatoxin B, and 85.0-100% for aflatoxin G. High % recoveries allowed detection of low levels of aflatoxins: 8 ppb of B, in a sample spotted as 0.5 g dried weight and 4 ppb as 1.0 g dried weight. RM

6 M 470

Growth and aflatoxin production in shelled corn by the Aspergillus flavus group as related to relative humidity and temperature.

Hunter, J. H.

Dissertation Abstracts International. Section B. The Sciences and Engineering 30 (4) 1447-48 (1969) [En] [Purdue Univ., Lafayette, Indiana, USA]

6 M 473

Note on aflatoxin decomposition in the process of making tortillas from corn.

Ulloa-Sosa, M.; Schroeder, H. W.

Cereal Chemistry 46 (4) 397-400 (1969) [5 ref. En] [Dept. of Plant Sci., A & M Univ., College Station, Texas 77843, USA]

In Latin American countries the process of making 'tortillas' (pancakes) from 'masa' (dough made from corn) involves lime (CaO) which reacts with water to form $Ca(OH)_2$. Expt. were carried out to determine the effect of this pr

kernels contaminated with aflatoxins. 5 lb of white corn kernels were inoculated with spores of Aspergillus flavus and incubated at 30°C and 90% RH for 2 wk. Kernels were washed, dried at room temp., and 300 g mixed with 900 g of sound corn. 1200 g of mixed corn, 2 l. of tap water and 150 g lime were boiled for 1 h, and the mixture cooled and strained to yield treated corn or nixtamal. Nixtamal was comminuted in a blender and mashed to a soft masa, which was used to make the tortillas. Aflatoxins were extracted and determined by thin layer chromatography. Average (of 3 samples) aflatoxin concn. (B, G, total in μg/50-g sample, respectively) at various stages were: mixed sound + contaminated corn, 19.51, 29.60, 49.11; nixtamal, 9.61, 7.37, 16.98; water (used to boil corn), 7.60, -, 7.60; masa, 12.09, 7.70, 19.79; tortillas 7.57, 5.11, 12.68; masa (after 72 h at 25°C) 7.27, 7.59, 14.86; tortillas (after 72 h at 25°C), 9.06, 6.40, 15.46. Aflatoxin concn. is reduced in the preparation of tortillas from contaminated whole-kernel corn; with heavily contaminated corn, toxins are still found in the tortillas. About two-thirds of the aflatoxins were removed by boiling the corn in lime water. G aflatoxins were largely decomposed during the process of making 'nixtamal'. Cooking of the masa as 'tortillas' apparently caused some decomposition of toxins.   VJG

---

6 N 217

Extraction of aflatoxins from cottonseed and peanut meals with ethanol.

Rayner, E. T.; Dollear, F. G.; Codifer, L. P., Jr.

Journal of the American Oil Chemists' Society 47 (1) 26 (1970) [9 ref. En] [Southern Utilization Res. and Development Division, Agric, Res. Service, USDA, New Orleans, Louisiana 70119, USA]

Cottonseed and peanut meals containing aflatoxins were extracted with 95.6% and 90.0% aqueous ethanol at 75°C to lower the level of aflatoxins. These solvents removed 93-96% of the aflatoxins in the cottonseed meal and 96-98% of the aflatoxins in peanut meal.   AS

---

6 N 227

Aflatoxins in cottonseed hulls.

Whitten, M. E.

Journal of the American Oil Chemists' Society 47 (1) 5-6 (1970) [5 ref. En] [Agric. Res. Center, Beltsville, Maryland 20705, USA]

Previous studies indicate that aflatoxins were found in laboratory-prepared hulls from cottonseed which contained aflatoxins. However, no aflatoxins were found in hulls commercially processed from cottonseed containing aflatoxins (crops 1964 and 1965). Some lots of hulls prepared from contaminated cottonseed under simulated commercial conditions, were found to contain small but measurable quantities of aflatoxins. In normal oil mill operation the linters content of the seed is reduced by 80-90% before dehulling. During laboratory operation, small quantities of fine meats containing aflatoxins may have been trapped in linters on the hulls, resulting in a positive test for aflatoxins. It may be concluded that commercial hulls processed from cottonseed with moderate aflatoxin contamination will contain little or no aflatoxins.   AS

---

7 C 159

Extraction partition and column chromatographic spearation of aflatoxins B_1 and M_1.

Masri, M. S.

Journal of the American Oil Chemists' Society 47 (2) 61-64 (1970) [14 ref. En] [Western Regional Res. Lab., Albany, California 94710, USA]

Extraction, partition and chromatographic elution characteristics of aflatoxin were studied. The novel use of aqueous dimethylsulphoxide or aqueous dimethylformamide for extraction from agricultural products was tested and found effective. Partition studies suggest advantages in analytical work of using solvent pairs in which benzene rather than (the usually employed) cloroform is used to transfer aflatoxin B_1 from primary extracts (aqueous phases). Tests of elution characteristics of aflatoxins B_1 and M_1 on silica gel columns with different developing solvents provided a basis for a procedure in which aflatoxins B_1 and M_1 of a test sample are recovered in separate eluates in which substances which interfere with thin layer chromatographic separation are minimized.   AS

---

7 C 166

Mycotoxin detection boosts quality control costs.

Smith, R.

Food in Canada 30 (1) 27-28 & 50 (1970) [En]

The new law governing the level of aflatoxin permitted in imported groundnuts will lead to control of other mycotoxins in foods. Species of Penicillium and Aspergillus also produce mycotoxins and regulations covering these are required. Methods are given for sorting out contaminated nuts by colour, contaminated kernels being darker.   RPC

---

7 J 666

The effects of aflatoxin B_1 on protein synthesis by cucumber cotyledon discs.

Truelove, B.; Davis, D. E.; Thompson, O. C.

Canadian Journal of Botany 48 (3) 485-91 (1970) [28 ref. En] [Univ. Agric. Expt. Sta., Dept. of Botany and Plant Pathology, Auburn, Alabama, USA

The effects of aflatoxin on amino acid uptake and incorporation into proteins by disks of cucumber cotyledon tissue showed that incubation for relatively short periods with low concn. of aflatoxin reduced the amount of ^{14}C-leucine absorbed without affecting incorporation into protein; increasing incubation time or increasing aflatoxin concn. inhibited the incorporation of absorbed leucine into protein. The effects of aflatoxin and actinomycin D on leucine absorption and incorporation were compared in a time course study. The data are discussed in relation to the possible mode of action of aflatoxin in plant tissues   AS

8 H 957
Aflatoxin formation in concentrated and diluted grapefruit juice.
Alderman, G.; Marth, E. H.
Bacteriological Proceedings 1970: 3 (1970) [En]
[Univ., Madison, Wisconsin, USA]

Commercial, conc. and diluted (1:1, 1:2, 1:3; juice-water), steamed grapefruit juice was inoculated with Aspergillus flavus known to produce aflatoxins B_1, B_2, G_1 and G_2. Juices were sampled after incubation for 10 and 14 days at 28°C. After extraction and column chromatograp[hy], aflatoxins in samples were resolved by using thin-layer chromatography [silica gel, Adsorbosil-5; solvent system, chloroform-methanol, 99:1 (v/v)] and measured with a fluorometer. After 10 days, the most B_1 (0.124 μg/ml) appeared in conc. juice, and the least (0.028 μg/ml) in juice diluted 1:3. Juices diluted 1:1 and 1:2 yielded 0.075 and 0.034 μg of B_1/ml, respectively. Diluted juices contained 0.022-0.036 μg of G_2/ml. 4 additional days of incubation resulted in increases in B_1 content of conc. and 1:1 diluted juices and in G_2 content of all juices. Aflatoxins B_2 and G_1 were not produced in sufficient quantities to permit detection by methods used. The pH value of most juices increased ~0.1 unit during incubation. Although most B_1 appeared in conc. juice, appearance of visible growth and onset of sporulation by the mould was slower in this than in diluted juices.   AS

8 P 1043
[Determination of aflatoxin B_1 in cheese.] Zur Bestimmung von Aflatoxin B_1 in Käse.
Kiermeier, F.; Groll, D.
Zeitschrift für Lebensmitteluntersuchung und Forschung 142 (2) 120-23 (1970) [12 ref. De, en]
[Inst. für Milchwissenschaft, Weihenstephan, W. Germany]

10 g ground cheese are extracted with $CHCl_3$ for 2 h in a Soxhlet apparatus; the extract is concentrated to 3 ml, dried over Na_2SO_4, and filtered into a 5 ml volumetric flask. 200 μl portions of the solution are analysed by 2-dimensional thin-layer chromatography on silica gel; aflatoxin spots are visualized in UV light, cut out and taken up in methanol, and aflatoxin content is assessed by extinction measurement at 363 nm.   SKK

9 C 203
[Presence of aflatoxins in animal feeds and in human foods of animal origin.]
Jacquet, J.; Boutibonnes, P.; Teherani, A.
Bulletin de l'Academie Veterianire de France 43 (1) 35-43 (1970) [19 ref. Fr] [Lab. de Microbiologie, Faculte des Sci., Caen, France]

Mycotoxins were present only in exceptional cases when 600 samples of various foods were examined using rapid thin-layer chromatography as described earlier [see C.r. hebd. Seanc .Acad. Agric. Fr. (1967) 53: 1244-51; Bull. Acad. natn. Med. 1969) 153: 647-653]. 98% of samples of African soils and dusts contained Aspergillus spores (of which 73% were A. flavus), a potential source of infection of peanut shells. 19 of 25 samples of peanut cake examined contained 10-4500 (average 300) μg/kg aflatoxins B and G. 5 of 23 samples of cattle feeds examined contained 5-2000 (average 90) μg/kg aflatoxins B and G. Aflatoxin was present in only 3 samples of St. Nectaire-type cheese out of 176 food samples examined (milk, dairy products, margarine and cheeses). Aflatoxins were not found in meats and meat products examined although various moulds were detected. The necessity for severe control of aflatoxin content of foods and food products is emphasized.
IF

9 J 899
Anaerobic and aerobic vacuum techniques for mycotoxin-free peanut drying.
Manbeck, H. B.; Nelson, G. L.; Lynd, J. Q.; Mason, M. E.
Transactions. American Society of Agricultural Engineers 13 (1) 93-98 & 106 (1970) [9 ref. En]
[State Univ., Stillwater, Oklahoma, USA]

Results of peanut drying expt. using a vacuum tumble drying system are reported in relation to visible growth of Aspergillus flavus on the peanut pod, whole peaut aflatoxin and peanut drying rates. Drying parameters employed were: drier jacket temp. 68° and 86°F; drier chamber vacua 15 and 20 in Hg; gas flow rates through the drying chamber 30 and 50 ft^3/h; and drying chamber convective media of air and N. Mould ratings, aflatoxin ratings and drying rates were subjected to 3 factor statistical analysis. The following results were obtained: A. flavus growth decreased with rise in drying temp., vacuum and gas flow rate, but was not affected by anaerobic atm. Anaerobic conditions increased aflatoxin production in whole nuts from 15.8 to 66.8 parts/billion. Excretion of aflatoxin and rate of mould growth were not directly related. Constant zone drying rates were directly proportional to drying temp., vacuum and gas flow rate. Falling rate of drying index, and therefore drying rate, increased with rise in temp., gas flow rate and vacuum level. For effective drying and inhibition of A. flavus growth and aflatoxin production, aerobic vacuum drying at 68°F, 20 in Hg and 50 ft^3/h was optimal among the treatments used. No detectable aflatoxin was present in the peanut kernels after any of the drying treatments.   RM

9 M 810
Mycotoxin from the blue eye mould of corn.
Kurtzman, C. P.; Ciegler, A
Bacteriological Proceedings 1970: 8 (1970) [En]
[Northern Regional Res. Lab., Peoria, Illinois, USA]

Blue eye is a common storage disease of corn caused by several species of Penicillium. One of these species, P. martensii, is prevalent on corn from central Illinois. This mould grows well on

high-moisture corn at near freezing temp. This fact becomes significant where in commercial practices, high-moisture corn is stored under refrigeration. In expt., mice died in 2-3 days after ingesting corn moulded by P. martensii and from intraperitoneal injections of chloroform extracts of this corn. The toxic substance was extracted and crystallized, and was found to be penicillic acid. A quantitative chemical assay procedure was developed which is applicable for detection of penicillic acid in corn and other grains. Penicillic acid production occurred over a temp. range of 1-34°C. Greatest production occurrred at the lower temp. where up to 5.85 mg/g of corn was produced. AS

9 N 334

Chemical inactivation of aflatoxins in peanut and cottonseed meals.

Mann, G. E.; Codifer, L. P., Jr.; Gardner, H. K., Jr.; Koltun, S. P.; Dollear, F. G.

Journal of the American Oil Chemists' Society 47 (5) 173-76 (1970) [15 ref. En] [Southern Regional Res. Lab., New Orleans, Louisiana 70119, USA]

Organic and inorganic reagents have been tested for destruction or inactivation of the aflatoxins present in peanut and cottonseed meals. The treatments were made in a special lab.-scale reactor, and were evaluated by determination of the aflatoxins in the products by thin layer chromatography. In some instances, a larger pilot-plant reactor was used. Ammonia, methylamine, sodium hydroxide and formaldehyde reduced aflatoxin levels and appear practical for large scale treatments. Effects of various reaction parameters including time, temp. and moisture content on the efficiency of these reagents are presented. AS

10 A 324

VIIIth International Congress of Nutrition. Abstracts of Papers. [Conference proceedings]

Masek, J. (Chairman)

121-234 (1969) [En, De, Fr & Ru]

[See preceding abstr.] A method for making yeast protein products with a pleasant flavour, by S. Danielsen & B. Westphal Eriksen (D3, En); Ribonucleotides and their use for quality determination of some foodstuffs, by J. Davidek & G. Janicek (D5-6, En); Cyclamate as a teratology agent, by H. Derse, O. Nees, R. Kruglicoff & M. Burger (D16, En); Changes in the nutritive value of proteins during culinary treatment of beef, by Z. Dvorak & I. Vognarova (D39, En); Effect of heat treatment on some nutrients in foods, by E. Dworschak, M. Kramer, M. Telegdy Kovats & E. Jurics (D40, En); Effects of soil fumigants and fungicides on the quality and nutrients of selected fruits and vegetables, by G. A. Emerson, I. J. Thomason, A. O. Paulus, G. G. Dull & J. W. Spines (E4-5, En); [Integrated development in the modern food industry], by S. Erdos (E8-9, De); Methods for production of durable bread and measures to prevent it becoming mouldy during storage, by A. Grenadieff & V. Radeff (G8, En); [Protein composition of African maize], by B. O. Gibirila (G10, Fr); Improving the nutritional and sensory quality of raw materials by microbiological fermentation, by A. Ginterova (G12, En); The utilization of beta carotene from carrot juice, by A. Gronowska-Senger, J. Zmijewski & S. Benger (G28-29, En); [Bacteriological investigation of frozen, table-ready meals], by D. Grossklaus & R. Levetzow (G29, De); The occurrence of mycotoxins or other active factors in products made with contaminated tomatoes, by K. Halacka, M. Polster & A. Pribela (H2, En); caplien substances in foods, their systematics and evaluation in the world and in Czechoslovakia, by K. Halacka & A. Szokolay (H2-3, En); Improving acceptability of high lysine maize, by D. Harpstead & A. Pradilla (H12, En); [Continued in following abstr.] VJG

10 A 326

VIth International Congress of Nutrition. Abstracts of Papers. [Conference proceedings]

Masek, J. (Chairman)

304-404 (1969) [En, De, Fr & Ru]

[Effect of processing and storage on quality of harvested plant products], by K. Kopec (K33, De); The utilization of some meat industry wastes for the production of edible casings, by J. Kotek & Z. Simunek (K34, En); Food hygiene problems of some herbicide residues, by S. Koudela & V. Cieleszky (K35-36, En); [Sugar contents of sugar beet as function of irrigation and distribution of nutrients during growth], by J. Kraslova (K41, Ru; Dilution technique as a method for determining flavour changes in irradiated fish, by R. Kurkela (K50-51, En); [Methods of evaluating food additives], by P. D. Leshchenko & L. S. Priputina (L5-6, Ru); [Construction and organization of nutritional and food technological research in W. Germany], by F. Krusen (K45, De); Prevention of mycotoxin infection of foods, by P. Lunven (L21, En); Determination of quality of blackcurrant juices by gas chromatographic analyses of heat space vapours, by W. Martinek (M15, En); An economic approach to food policy within national development planning, by J. McKigney (M27, En); [Effect of cultivation conditions on pure content of potato], by B. Mica (M29, De); [Production of infant foods from poultry meat], by S. Mitkov, T. Vasilev, I. Ionova, I. Davidova & T. Nikolova (M34-35, Ru); Attempt to obtain the high quality protein-carotene complex and the possibility of using it for enrichment of food, by W. W. Mleczko (M36, En); Food additives programme, by H. P. Mollenhauer (M37, En); A protein-rich food for feeding the young in the United Arab Republic (Egypt), by S. R. Morcos,

O. M. Galal, H. Hassan & M. Hussein (M38, En); Studies on the nutritive value of 'Bouza' [fermented wheat product], by S. R. Morcos, S. Hegazi & S. Eldamhougi (M39, En); Studies on the nutritional value of tempeh, by K. Murata, H. Ikehata & T. Miyamoto (M43-44, En); Effects of food processing on nutritive value, by J. H. Nair (N 2, En); The nutritive value of shark meat, by L. R. N. Jaa [L. R. Njaa], G. Boge & O. R. Braekkan (N7-8, En); VJG

10 C 219
Mycotoxins. [A review]
Moss, M. O.
International Biodeterioration Bulletin 5 (4) 141-50 (1969) [80 ref. En] [Dept. of Biological Sci., Univ. Surrey, 14 Falcon Rd., London SW11, England]

10 M 956
Effects of moisture content and temperature on aflatoxin production in corn.
Trenk, H. L.; Hartman, P. A.
Applied Microbiology 19 (5) 781-84 (1970) [28 ref. En] [Dept. of Bact., St. Univ., Ames, Iowa 50010, USA]

Samples of freshly harvested corn with moisture contents (MC) of 18-28% were stored at 2, 13 or 24°C for ⩽71 days. Low levels (50 ng/g) of aflatoxin were present in 2 of the samples. In a 2nd series of tests, corn previously stored at 13% MC was adjusted to 18-26% MC and stored at 24, 30 or 35°C. All but one of the samples contained from 100 to 2000 ng aflatoxin/g. The highest levels were found at 30 and 35°C with 26% MC. The remoistened corn was found to be contaminated with large numbers of aspergilli. From a total of 232 fungi isolated from the samples, only strains of Aspergillus flavus produced aflatoxins. The increased numers of Asp. flavus and aflatoxin formation in remoistened corn may be of importance in the storage of corn. MEG

10 T 354
Studies of the fungus flora of black and white pepper and of the factors affecting its development.
Moreno-Martinez, E.
Dissertation Abstracts International. Section B. The Sciences and Engineering 30 (8) 3452 (1970) [En] [Univ., Minneapolis, Minnesota 55414, USA]

Three methods of oven drying (103°C to constant wt., 130°C for 1 h, and 5 h at 98°C under vacuum) gave similar results for the moisture content of pepper (Piper nigrum L.), but the results ranged from 0.8% to 3.2% higher than those determined by toluene distillation. 71 samples of pepper ranged from 200 to 610, 700 colonies of fungi (7 spp.) per g, and the min. moisture contents permitting growth of the 7 spp. (14-19%) in ground black and white pepper are shown. Eight isolates of the major fungi were grown and fed to rats; 64% of the isolates were lethal. Pepper was a suitable substrate for aflatoxin production. GLS

11 C 243
Aflatoxin as a health hazard. [A lecture]
Barnes, J. M.
Journal of Applied Bacteriology 33 (2) 285-98 (1970) [33 ref. En] [Med. Res. Council Toxicology Unit, Woodmansterne Road, Carshalton, Surrey, England]

In this lecture the author reviews the discovery, chemistry and biological effects of (i) aflatoxin, and its mode of action in expt. animals. The situation regarding human exposure to (i) is discussed for the UK, where exposure levels are considered to be very low, and for developing countries, where nutrition is different and from which less data are available. The author concludes with an assessment of likely exposures to (i) and measures for reduction of the hazard. BEPC

11 C 253
[Aflatoxins and aflatoxicosis.] [A review]
Valfre, F.; Castagnoli, O. Z.
Veterinaria Italiana 21 (suppl. to 3/4) 293-344 (1970) [215 ref. It] [Ist. Superiore di Sanita, Rome, Italy]

11 C 255
[Aflatoxins in industrial mould strains and in mould enzyme preparations.]
Bulinski, R.
Przemysl Spozywczy 24 (4) 161-63 (1970) [33 ref. Pl, ru, en, fr, de] [Katedra Nauki o Srodkach Spozywczych i Higieny zywienia Akad. Med., Lublin, Poland]

41 strains of industrial moulds (33 strains of 8 Aspergillus spp., 5 strains of 4 Penicillium spp. and 1 strain of Rhizopus nigricans) were etamined for aflatoxin formation; aflatoxin was detected in cultures of 1 Asp. niger and of 1 Asp. ruber spp. SKK

11 J 1241
Aflatoxin removal.
Goldblatt, L. A.; Robertson, J. A., Jr. (United States of America, Department of Agriculture)
United States Patent 3 515 736 (1970) [En]

Oil-free peanut meal is extracted with an azeotropic mixture of acetone, hexane and water to remove aflatoxin. IFT

11 J 1242
[Problems related to the transport and storage of peanut seeds and meals.]
Agata, R. d'
Rivista Italiana delle Sostanze Grasse 47 (2) 67-72 (1970) [It, fr, es, en, de] [Oleifici Italiani, Porto Marghera, Italy]

Problems connected with the transport and storage of peanut seeds and meals are explained. The presence of Aspergillus flavus and methods of reducing the troubles due to aflatoxin formation are considered. AS

11 S 1052
The effect of aflatoxins on the vitamin A storage in the livers of chickens.
Kriz, H.
Acta Veterinaria (Brno) 39 (2) 131-34 (1970) [5 ref. En, cs, ru] [Dept. of Poultry Diseases, School of Vet. Med., Univ., Brno, Czechoslovakia]

12 C 271
Effect of aflatoxin on reproduction in rats.
Panda, P. C.; Sreenivasamurthy, V.; Parpia, H. A. B.
Journal of Food Science and Technology (Mysore) 7 (1) 20-22 (1970) [24 ref. En] [Central Food Technological Res. Inst., Mysore, India]

Male and female albino rats were fed a stock diet containing aflatoxin (50 μg aflatoxin B/rat/day) during the entire mating, gestation, and lactation period of the females. No effect on the oestrus cycle of the adult female was observed. Litter size and birth weight were unaffected, but a significant increase was shown in intra-uterine foetal resorption in the pregnant rat. A significant decrease in weaning weight was observed in the group fed aflatoxin. MHEG

12 C 282
Aflatoxin and kojic acid production by resting cells of Aspergillus flavus link.
Basappa, S. C.; Sreenivasamurthy, V.; Parpia, H. A. B.
Journal of General Microbiology 61 (1) 81-86 (1970) [8 ref. En] [Central Food Technological Res. Inst., Mysore, India]

12 C 283
The rapid separation of aflatoxins on silica gel coated glass cylinders.
Maing, I.-Y.; Lillard, H. S.; Ayres, J. C.
Journal of the American Oil Chemists' Society 47 (6) 212-14 (1970) [12 ref. En] [Dept. of Food Sci., Univ., Athens, Georgia 30601, USA]

A chromatographic method is described for the separation of aflatoxins on silica gel coated glass cylinders prepared with a chloroform-acetone slurry. This can be done in 35-40 min compared with >2 h for thin layer chromatography (TLC). This method is more rapid, economical and its sensitivity is comparable to TLC. AS

12 C 285
Toxicants naturally occurring in foods. [A review]
Swaminathan, M.; Daniel, V. A.
Indian Journal of Nutrition and Dietetics 7 (2) 105-18 (1970) [35 ref. En] [Central Food Technological Res. Inst., Mysore-2, India]

A brief account of the more important naturally occurring toxicants in foods is presented under the following headings: lathyrogens, favism, haemagglutinins, ackee poisoning, presser amines, fungal toxins (Claviceps purpurea, Aspergillus species, Penicillium species, Stachybotrys atra, Fusarium species, Pithomyces chartarum, mushroom poisoning, other toxic fungi), seafood toxins (ciguatera, moray eel, scrombroid, puffer fish, cephalopod, other seafoods), toxicants in certain natural spices and flavours (allyl isothiocyanate, capsicum, myristicin, coumarin, safrol, thujone, other spices), toxic substances found in certain food fats, antivitamins, cyanogenetic glucosides, tumerogens and carcinogens, goitrogens, oestrogens, miscellaneous organic toxicants occurring in foods (djenkol beans, Leucaena glauca, wild yam, solanine poisoning, atriplism, bush tea, saponins, white snacker root, American water hemlock, death camas, berries of coytillo plant), toxic minerals and other inorganic compounds occurring in food and water (seleniums, fluorine, nitrates and nitrites, oxalates), radioactive material in food. JA

VOLUME 3

1 C 3
Aflatoxin. Scientific background, control, and implications. [A book]
Goldblatt, L. A. (Editor)
xii+472pp. (1969) [Numerous ref. En] New York, USA & London, UK: Academic Press Inc. Price $21.50 [Southern Utilization Res. and Development Div., Agric. Res. Service, USDA, New Orleans, Louisiana, USA]

This volume in the Food Science and Technology series of Monographs is of interest to all concerned with production and processing of food and feeds, nutrition and animal and public health. Chapters include: Aflatoxin formation by Aspergillus flavus, by U. L. Diener & N. D. Davis (pp. 13-54, numerous ref.); Structure and chemistry of aflatoxins, by G. Buchi & I. D. Rac (pp. 55-75, 29 ref.); Physicochemical assay of aflatoxins, by W. A. Pons, Jr. & L. A. Goldblatt (pp. 77-105, 80 ref.); Biological assay for aflatoxins, by M. S. Legator (pp. 107-49, 74 ref.); Metabolism and biochemical effects of aflatoxins, by G. N. Wogan (pp. 151-86, 66 ref.); Types of mycotoxins in foods and feeds, by A. J. Feuell (pp. 187-221, numerous ref.);

Aflatoxicosis in farm animals, by R. Allcroft (pp. 237-64, 67 ref.); Aflatoxicosis and trout hepatoma, by J. E. Halver (pp. 265-306, 57 ref.72 fungal spoilage in stored crops and its control, by C. Golu numerous ref.); Processing to ensure wholesome products, by C. J. Kensler & D. J. Natoli (pp. 333-35, 17 ref.); Appendit (Voluntary code of food practices for purchasing, handling, storage, processing and testing of peanuts. 6th edition, Nat. Peanut Council, Aug. 1968) (pp. 355-58); Detoxification of aflatoxins in foods and feeds, by F. G. Dollear (pp. 359-91, 78 ref.); Regulatory aspects of control of mycotoxins in foods and feeds, by B. L. Oser (pp. 395-400, 6 ref.); and Implications of fungal toxicity to human health, by H. F. Kraybill & R. E. Shapiro (pp. 401-41, numerous ref.). JA

1 C 7
[Toxin-forming fungi.] Toxinbildende Schimmelpilze.
Frank, H. K.
Confructa 15 (2) 68-71 (1970) [22 ref. De, en]
[Inst. für Physik und Biol., Bundesforschungsanstalt für Lebensmittelfrischhaltung, Karlsruhe, W. Germany]

A review is given of toxin-forming fungi and mycotoxins, with special emphasis on patulin (synonyms: clavatin, claviformin, expansin, leucopin, mycoin C, penicidin, ternicin), a 4-hydroxy furopyran with strong phytotoxic and zootoxic properties. Its occasional presence in fruit products cannot be ignored. Tolerance levels for aflatoxins in fodder in Common Market countries are given. JMS

---

1 G 5
Nutritive value and wholesomeness of fermented foods.
Veen, A. G. van; Steinkraus, K. H.
Journal of Agricultural and Food Chemistry 18 (4) 576-78 (1970) [18 ref. En] [St. Agric. Expt. Sta., Cornell Univ., Geneva, New York 14456, USA]

It would appear that fermentation does not improve the nutritive value of the protein. During fermentation some vitamins increase; others may decrease. Digestibility for humans of certain fermented foods such as tempeh, ontjom, and bongkrek is improved over the ingredients. The keeping quality of fermented foods is generally increased. Cooking times are often decreased. The organoleptic characteristics of fermented foods are generally improved over the raw ingredients. It would appear that the wholesomeness of fermented foods is as good as and, in some cases, better than that of the ingredients from which they are produced. Certain fermented foods, such as ontjom and bongkrek, may be hazardous to health if they are produced from raw materials which contain aflatoxin or are improperly fermented. AS

1 P 230
[Formation of aflatoxin in cheese.] Untersuchungen zum Problem der Aflatoxinbildung in Käse.
Rothenbühler, E.; Bachmann, M.
Schweizerische Milchzeitung 96 (74) Wiss. Beil. Nr. 123: 1053-56 (1970) [28 ref. De, fr, en]
[Milchtechnisches Inst. der ETH, Zurich, Switzerland]

Small amounts of aflatoxin, $\sim$0.4 μg/g, could be detected in Tilsit and Emmental cheeses which had been inoculated with Aspergillus flavus (strain 373, Frank) and held for $\sim$20 days at 30 or 20°C, but not if they were held at 10°C. By this time, however, mould growth was too heavy to be acceptable. On the other hand no trace of aflatoxin could be detected in any of 24 different types of cheese which had been exposed for 2-4 months to spontaneous and uncontrolled mould growth. The aflatoxin content of cheese was determined by the method of Frank [FSTA (1969) 1 10C451] which is based on TLC of a chloroform extract of the cheese followed by examination under UV light at 350 nm. GTP

1 P 231
[Formation of aflatoxin B$_1$ in cheese.] Zur Aflatoxin B$_1$-Bildung in Käsen.
Kiermeier, F.; Groll, D.
Zeitschrift für Lebensmitteluntersuchung und -Forschung 143 (2) 81-89 (1970) [50 ref. De, en]
[Inst. für Milchwissenschaft, Weihenstephan, W. Germany]

No evidence of the presence of aflatoxin B$_1$ was found in 129 samples of various types of cheese in the Munich area. Artificial infection with spores of Aspergillus flavus failed to produce aflatoxin B$_1$ in Camembert and Romadur cheeses, but was successful in forming it in Tilsit cheese, as was also infection with spores of Aspergillus parasiticus. Growth of these organisms and formation of the toxin occurred at 18-30°C and >79% RH; optimum conditions were 26°C and 99%RH. In view of these findings, the possibility that aflatoxin may be formed in factories making certain types of cheese cannot be excluded. GTP

2 A 88
Food science in India.
Webb, F. C.
Process Biochemistry 5 (10) 32-33 & 39 (1970) [En]
[Univ. Coll., London, UK]

Work being carried out in India to raise the general standard of nutrition and health is outlined and includes methods of insecticide application, residue levels, milling techniques, toxicity control (especially that of aflatoxin in groundnuts), and nutritional research, including development and use of supplementary proteins. AF

2 C 23
Symposium on natural food toxicants. [A symposium]
Crosby, D. G. (United States of America, Chemical Society) (Chairman)
pp. 413-538 (1969) [Numerous ref. En] Washington,

DC, USA: American Chemical Society [Univ., Davis, California, USA]

The papers presented at this symposium were published in J. agric. Fd Chem. (1969) 17 (3) 413-538, and those relevant have already been abstracted and published in FSTA. They are: Studies on shellfish poisons, by E. J. Schantz (pp. 413-16, 31 ref.) [FSTA (1969) 1 10R268]; Toxins from eggs of fish and amphibii, by F. A. Fuhrman, G. J. Fuhrman, D. L.Dull & H. S. Mosher +pp. 417-24, 50 ref.) [FSTA (1969) 1 10R267]; Toxins from mouldy cereals, by J. R. Bamburg, F. M. Strong & E. B. Smalley (pp. 443-50, 81 ref.) [FSTA (1970) 2 1M54]; Destruction of aflatoxins in peanuts during dry and oil roasting, by L. S. Lee, A. F. Cucullu, A. O. Franz Jr. & W. A. Pons Jr. (pp. 451-53, 7 ref.) [FSTA (1969) 1 10J923]; Relation of aflatoxins in cotton seeds at harvest to fluorescence in fibre, by P. B. Marsh, M. E. Simpson, R. J. Ferretti, T. C. Campbell & J. Donoso (pp. 462-67, 16 ref.) [FSTA (1969) 1 10N431]; Mechanism of formation of a fluorescence in cotton fibre associated with aFerretti, G. V. Merola, J. Donoso, G. Craig, M. W. Trucksess & P. S. Work (pp. 468-72, 13 ref.) [FSTA (1969) 1 10N432]; Natural glucosinolates (thioglucosides) in foods and feeds, by C. H. VanEtten, M. E. Daxenbichler & I. A. Wolff (pp. 483-91, 107 ref.) [FSTA (1969) 1 10J902]; Toxic peptides and amino acids in foods and feeds, by J. W. Hylin (pp. 492-9, 48 ref.) [FSTA (1969) 1 10C465]; [Continued in following abstr.] JA

2 C 25
Some food facts and fallacies.
Coppock, J. B. M.
Community Health 1 (5) 237-44 (1970) [En]
[Spillers Ltd., Old Change House, Cannon St., London, EC4, UK]

Toxicants occuring naturally in commonly used foods, such as pressor amines in bananas and cheese; goitrogens in cabbage, cauliflower, sprouts and turnips; fungal totins on cereals; haemagglutinins in legumes; myristicin in nutmeg; solanine in potatoes oxalates in rhubarb, turnips, are discussed. PEG

2 C 29
Food-borne infections and intoxications. A four-year summary report, October 1 1965-September 30 1969. [A report]
United States of America University of California, Food Protection and Toxicology Center
206pp. (1969) [Numerous ref. En] Davis, California, USA: University of California, Food Protection and Toxicology Center

Reports on 4 research projects of the Food Protection and Toxicology Center are presented. They are: Salmonella and Arizona group infections of avian origin (pp. 23-109), which embraces studies on ecology of Salmonella, destruction of Salmonella by heat, Salmonella contamination of poultry carcasses and derived foods, and Arizona group infections in turkeys; Studies of Clostridium botulinum and Cl. perfringens (pp. 110-77), designed to evaluate the extent of food contamination by Cl. botulinum, to determine what other micro-organisms are associated with it, and to evaluate the effects of various factors (temp., pasteurization, freezing and drying, water activity, pH, oxidation-reduction potential, gas phase, packaging materials and methods, chemical additives, effect of lipids and proteins on thermal resistance, and harvesting, preparation and processing procedures) on the survival, germination, growth and toxin production of Cl. botulinu ; Studies of toxigenic staphylococci (pp. 178-96), covering detection of enterotoxins, enterotoxin C purification, initiaton of growth and production of enterotoxins as a function of temp. and water activity and curing factors, staphylococcal growth and enterotoxin production in cured meats, competition between staphylococci and food bacteria, and incidence of enterotoxigenic staphylococci in poultry livers and their comparison with strains isolated from food poisoning outbreaks; and Studies of the mycotoxins (pp. 197-204), covering effect of aflatoxin on chickens. JA

2 C 32
[Trends in mycotoxin research in the past and present.] Tendenzen der Mycotoxin-Forschung in Vergangenheit und Gegenwart. [A lecture]
Meyer, H.; Leistner, L.
Archiv für Lebensmittelhygiene 21 (8/9) 178-84 (1970) [Numerous ref. De, en] [Inst. für Bakt. und Hist., Bundesanstalt für Fleischforschung., Kulmbach, W. Germany]

Development of mycotoxin research up to the present day is discussed. While research into ergotism was carried out before 1890 it was almost non-existent by 1960, when research into toxic antibiotics and mould products was at its height. Aflatoxin research started about 1960 and today is pursued to almost the same extent as that into moulds and antibiotics. Mycotoxin research, other than aflatoxins, was prominent in the 1920's and today is again so. A table of toxic moulds is given as well as one of mycotoxins grouped according to their degree of toxicity, and a table giving the year of discovery of important mycotoxins from 1900 to 1970. At the present time ~60 mycotoxins and 240 toxigenic mould species are known. OA

2 C 33
Chemistry of aflatoxins. [A review]
Mathew C. P.

Chemistry and Industry 1970 (28) 913-17 (1970) [43 ref. En] [Dept. of Organic Chem. Christian Med. Coll., Vellore-2, Tamil Nadu, India]

Literature on the occurrence and isolation of aflatoxins, their physical characteristics, structure, synthesis and chemical reactions (e.g. reduction, oxidation, hydrolysis, addition reactions, acetylation, thioketal formation, photochemical reactions) is reviewed. BFMIRA

2 C 34

Some chemical characteristics and biological effects of photomodified aflatoxins.

Lillard, D. A.; Lantin, R. S.

Journal of the Association of Official Analytical Chemists 53 (5) 1060-63 (1970) [9 ref. En] [Dept. of Food Tech., St. Univ., Ames, Iowa 50010, USA]

Changes in UV and IR absorption spectra were demonstrated upon prolonged exposure of solutions of aflatoxins B_1 and G_1 to long wave UV light. The treated toxins were less toxic to chick embryos and had lower Rf values on thin layer chromatograms than the parent compounds. These modified compounds may lack either the double bond of the furan ring or the furan ring itself may be removed from the coumarin portion of the molecule. Furthermore, the lactone ring of the aflatoxins is not opened upon exposure to UV light and is not the reason for decreased toxicity. AS

2 J 146

Limiting temperature and relative humidity for aflatoxin production by Aspergillus flavus in stored peanuts.

Diener, U. L.; Davis, N. D.

Journal of the American Oil Chemists' Society 47 (9) 347-51 (1970) [16 ref. En] [Botany and Plant Pathology Dept., Univ. Agric. Expt. Sta., Auburn, Alabama 36830, USA]

Sound mature kernels, broken mature kernels, immature kernels and unshelled cured Early Runner peanuts were inoculated with spores of Asp. flavus and incubated up to 84 days in controlled environment cabinets. In a series of expt., temp. ranged from 8 to 49°C in combination with 98 ± 1% RH; in others RH was varied from 70 to 99% at 30 ± ½°C and from 83 to 99% at 20 ± ½°C. Samples were removed after 7, 21, 42 and 84 days of incubation and assayed for aflatoxin, free fatty acids and peanut kernel moisture. Aflatoxin was formed in sound mature kernels at 40°C and 14°C and in broken mature kernels at 13°C, but none was formed at 41°C after 21 days or at 12°C after 84 days in 98 ± 1% RH. The limiting temp. for aflatoxin formation in peanut kernels with intact shells were 41°C for 21 days and 16°C for 84 days of incubation. The limiting RH at 30°C for aflatoxin production in sound mature kernels was 84%, were removed after 7, 21, 42 and 84 days of incubation whereas in limiting RH was 86% for 84 days of incubation. The limiting RH at 20°C for sound and broken mature kernels was 83%, whereas it was 86% for immature kernels and 92% for kernels from unshelled peanuts. Free fatty acid formation was correlated with visible growth of fungi rather than with aflatoxin production. Aflatoxin formation was generally correlated with kernel moisture contents of 10% or higher. AS

2 N 78

[Characteristics of Burmese vegetable oils.] Zur Kenntnis burmesischer Pflanzenöle.

Tin-Tin-Oo, D.

Nahrung 14 (4) 297-301 (1970) [11 ref. De, ru, en]

Typical commercial Burmese peanut, sesame and coconut oils were analysed for the following: saponification, I and acid values, tocopherol, carbonyl and peroxide contents, aflatoxin and quantitative gas chromatographic analysis of the fatty acids. The results given in the literature are compared with those obtained for extracted peanut and sesame oil. IN

2 P 263

Survey of commercial milk samples for aflatoxin M.

Brewington, C. R.; Weihrauch, J. L.; Ogg, C. L.

Journal of Dairy Science 53 10) 1509-10 (1970) [10 ref. En] [Dairy Products Lab., E. Util. Res. and Development Div. Agric Res. Service, USDA, Washington DC 20250, USA]

A method based on that of Masri et al. [FSTA (1969) 1 12P1197] and able to detect <0.001 ppm aflatoxin M on a fluid milk basis, was used in a survey, carried out in the USA, of aflatoxin M in commercially available milks including bottled whole milk, dried skim-milk and canned evaporated milk, and also in bulk whole milk and farm milk samples. No aflatoxin M was detected in any milk samples. CDA

3 C 43

Aflatoxins M_1 and M_2: preparation and purification.

Stubblefield, R. D.; Shannon, G. M.; Shotwell, O. L.

Journal of the American Oil Chemists' Society 47 (10) 389-90 (1970) [11 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

A crude product containing aflatoxins M_1 and M_2, as well as large quantities of aflatoxins B_1 and B_2, obtained by fermentation of rice with Aspergillus flavus NRRL 3251 was chromatographed on a silicic acid column. Almost all the B_1 and B_2 were separated from M_1 and M_2. Aflatoxins M_1 and M_2 were eluted together with ethanol-chloroform (5:95 v/v). The combined M_1 and M_2 fraction was placed on a Merck silica gel (0.05-0.2 mm) column to be washed with hexane-chloroform (1:1 v/v) and chloroform to remove traces of B_1 and B_2 and eluted with ethanol-chloroform (1.5:98.5 v/v) to obtain aflatoxin M_1 and and B_2 and eluted with ethanol-chloroform (1:1 v/v) and chloroform to remove traces of B_1 and B_2 and eluted with ethanol-chloroform (1.5:98.5 v/v) to obtain aflatoxin M_1 and mixtures of M_1 and M_2. Rechromatography of M_1 on another silica gel column gave pure M_1 which was crystallized from acetonitrile. Aflatoxin M_2 was prepared by hydrogenation of M_1 and crystallized from acetonitrile. AS

3 C 44

Aflatoxin production as affected by environmental conditions.

Epstein, E.; Steinberg, M. P.; Nelson, A. I.; Wei, L. S.

Journal of Food Science 35 (4) 389-91 (1970) [16 ref. En] [Dept. of Food Sci., Univ., Urbana, Illinois 61801, USA]

The effects of controlled atmosphere (CA) (10% CO_2, 1.8% O_2 and 88.2% N_2) and air were noted on the growth and aflatoxin production of Aspergillus flavus incubated at several temp. on 2 substrates. In liquid medium, the mould grew well and produced toxin in both air and CA at room temp. at 60°F, growth and toxin were substantial in air but minimal in CA. At temp. of 54°F and below, toxin was inhibited; growth was minimal in air and inhibited in CA. Cracked corn of 16.6, 18.8, 23.6 and 31.2% moisture content (dry basis) also was studied. At 31.2% moisture and 60°F, growth was reduced in CA to a greater extent than in air, whereas sporulation and toxin in CA showed a longer lag period at both 84 and 60°F.   AS

3 C 55
SOS/70. 3rd International Congress of Food Science and Technology, Washington, DC, Aug. 9-14, 1970. Abstracts of papers. Food safety. [A symposium]
Ingram, M. (United States of America Institute of Food Technologists) (Chairmann)
Abstracts 90, 91, 92, 93, 94, 95 & 96 (1970) [En] [Meat Res. Inst., Bristol, UK]

Abstracts are presented of the following papers: Incidence of Salmonella with special reference to northwestern Europe, by E. H. Kampelmacher; An evaluation of salmonellosis in the United States, by K. H. Lewis; Vibrio parahaemolyticus poisoning in Japan, by T. Kawabata; Viral hepatitis associated with foods, by D. O. Cliver; Importance of aflatoxin in foods with reference to India, by H. A. B. Parpia & V. Sreenivasa Murthy; Determination of aflatoxins in foods and feeds, by W. A. Pons Jr., A. F. Cucullu & L. S. Lee; and Mycotoxins other than aflatoxins, by G. N. Wogan.   JA

3 H 426
[Fungi in fruit juices and dangers from products of their metabolism.] Pilze in Fruchtsäften und die Gefährlichkeit ihrer Stoffwechselprodukte. [A lecture]
Rehm, H.-J.
Flüssiges Obst 37 (8) 342-46 (1970) [20 ref. De] [Inst. für Mikrobiol. Univ., Münster, W. Germany]

The most important fungi occurring in fruit juices Byssochlamys fulva, Penicillium velutinum, P. roqueforti, P. expansum, P. digitatum, Aspergillus niger, Asp. amstelodami, Cladosporium strains, their spoilage capacity and mycotoxin production are discussed. Topics covered are: primary and secondary products of fungal metabolism and their importance in fruit juice spoilage; mechanism of formation, and factors influencing the formation of mycotoxins (aflatoxins, byssochlamic acid, ochratoxin A, luteoskyrin, patulin); and possibilities of mycotoxin formation under various technological conditions (pasteurized or unpasteurized juice, low or high O_2 content in juice, effect of raw materials spoiled by fungi, storage in contaminated tanks). Structural formulae of the mycotoxins are given.   JMS

3 N 126
Aflatoxin in Indian peanut oil.
Dwarakanath, C. I.; Sreenivasamurthy, V.; Parpia, H. A. B.
Journal of Food Science and Technology (Mysore) 6 (2) 107-09 (1969) [6 ref. En] [Central Food Tech. Res. Inst., Mysore, India]

Most of the peanut oil produced in India is used in food. The aflatoxin content of unrefined oil varies from 0.02 to 0.26%. Aflatoxin was absent from the samples of refined and hydrogenated peanut oil examined. Half of the aflatoxin in an unrefined oil disappears after 10 min at frying temp. (150°C), but the oil would have to be heated to 250°C (above the smoke point) to ensure complete removal. Fried wheat flour foodstuffs absorbed aflatoxin in proportion to their absorbtion of frying oil. The tamarind pulp which is added to control frothing during frying has no effect on the aflatoxin content, but a significant reduction is effected by casein or areca nut powder.   TW

4 C 65
[The importance of fungi in food.] Die Bedeutung von Schimmelpilzen bei Lebensmitteln.
Frank, H. K.
Ernährungs-Umschau 17 (9) Lehre u. Praxis: 33-34 (1970) [De] [Bundesforschungsanstalt für Lebensmittelfrischhaltung, Karlsruhe, W. Germany]

The following topics are briefly discussed: fungi as source of aroma and flavour compounds in food e.g. Gorgonzola cheese; production of antibiotics by fungi; toxic fungi, covering ergot and aflatoxins; and carcinogenic mycotoxins.   MJS

4 C 66
Aflatoxins and fermented foods in Japan.
Matsuura, S.
Japan Agricultural Research Quarterly 5 (1) 46-51 (1970) [6 ref. En]

Production methods for 2 Japanese fermented foods, miso (prepared from soybeans and rice and containing 10-18% protein and 5-12% salt) and shoyu (a seasoning made from soybeans and wheat and containing ~18% salt) are illustrated by flow-sheets. Extensive studies were carried out to determine whether aflatoxins are present in koji-mould strains used in miso and shoyu production (Aspergillus oryzae, Asp. sojae), rice (Japanese and imported), rice koji, shoyu and miso. Improved TLC and liquid chromatography methods for separating and detecting aflatoxins are briefly outlined. No aflatoxins were detected in any of the samples examined. Aflatoxin-like compounds were detected in ~30% of the koji-moulds examined, but these compounds differed from aflatoxins in their UV absorption spectra.   GLS

4 J 409
Note on a rapid determination of aflatoxins in peanuts and peanut products.
Liem, D. H.; Beljaars, P. R.
Journal of the Association of Official Analytical

Chemists 53 (5) 1064-66 (1970) [15 ref. En] [Food Inspection Service, Blijdensteinlaan 2, Enschede, The Netherlands]

A simple and rapid extraction procedure, based on a direct extraction introduced by Pons [J. Ass off. analyt. Chem. (1966) 49: 554-62] and a single liquid-liquid extraction proposed by Waltking, [FSTA (1969) 1 7C281], is described for peanuts and peanut products. Methanol is used as the extracting solvent. TLC, using the system described by Engstrom [FSTA (1970) 2 1A29], yield satisfactory results. The method is suitable for aflatoxin B_1 levels of μg/kg (or higher) in peanut butter and roasted peanut products. Aflatoxin B_1 levels down to 3 μg/kg can be detected in raw peanuts and peanut shavings. AS

4 M 501

[The occurrence of aflatoxin in bread.]

Spicher, G.

Zentralblatt für Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, II. Abteilung 124 (7) 697-706 (1970) [17 ref. De, en] [Bundesforschungsanstalt für Getreideverarbeitung, Berlin, Germany]

Type B and G_1 aflatoxins were detected in 14 of 59 loaves, almost exclusively in loaves made from mixed rye and wheat flour. The aflatoxin-forming moulds, isolated from contaminated loaves were identified as penicillia and aspergilli. A survey of these genera obtained from a collection originally isolated from the air of bakeries, bread stores and spoiled corn showed that ~11% were capable of producing aflatoxin. BR

4 Q 76

A study of aflatoxicosis in laying hens.

Sims, W. M., Jr.; Kelley, D. C.; Sanford, P. E.

Poultry Science 49 (4) 1082-84 (1970) [14 ref. En] [Dept. of Infectious Diseases, St. Univ., Manhattan, Kansas 66502, USA]

Aflatoxins or their fluorescing metabolites were not detectable in the eggs of hens receiving aflatoxins mixed in feed at dose levels of 2, 4, and 8 ppm, and eggs from hens receiving per os comparable quantities of crude aflatoxins. Assays of livers from hens at each dose level were negative for aflatoxins or fluorescing metabolites. A statistically significant ($P = 0.05$) decrease in egg production due to the administration of aflatoxins was noted, but there was no effect on egg size. The possibility of a public health hazard due to the consumption of eggs from hens receiving aflatoxins must be considered minimal. No aflatoxins or fluorescing metabolites were found in the eggs from De-Kalb 161 hens. With the present marketing and purchasing methods, there is little possibility of an individual receiving eggs from one source for any length of time. AS

5 A 184

The neutron activation analysis programme of the Food and Drug Administration.

Tanner, J. T.; Lambert, J. P. F.; Simpson, R. E.

Journal of the Association of Official Analytical Chemists 53 (6) 1140-44 (1970) [9 ref. En] [Div. of Food Chem. and Tech., FDA, Washington, D 20204, USA]

Activation analysis is a rapid and sensitive method of trace element analysis applicable to a large variety of samples. For the most part the method is nondestructive; however, for highest sensitivity, chemical separations are usually required. For about 4 yr the Food and Drug Administration, utilizing the Naval Research Laboratory reactor, has applied neutron activation to various samples of foods, drugs, and biological materials. Elements such as V, Se, and Hg have been determined at the nanogram level with little interference from the matrix. Possibly more important than interest in specific element determinations themselves is utilization of the elements or element profiles as indices of required information. Thus, in several forensic applications the authenticity of drugs and food items has been evaluated through the characteristic γ-ray spectral "signatures". Through neutron activation the distribution of mycotoxin contamination in batches of foodstuffs has been simulated to establish homogenity of sample preparations. This paper presents some earlier examples of the applications of neutron activation analysis which have been made by the FDA and summarizes recent work. AS

5 C 75

Fluorometric measurement of aflatoxins.

Childs, E. A.; Ayres, J. C.; Koehler, P. E.;

Journal of the American Oil Chemists' Society 47 (11) 461-62 (1970) [7 ref. En] [Food Sci. Div., Univ., Athens, Georgia 30601, USA]

An accurate, precise and sensitive fluorometric method for quantifying purified aflatoxins in solution is proposed. After purification, aflatoxin samples are read in a fluorometer with a primary filter of 365 nm and a secondary filter of 435 nm for B and B_2 and 465 nm for G_1 and G_2. The method is precise at as little as 0.0002 μg/ml B_1 and G_1 and 0.00006 μg/ml B_2 and G_2, and accurate at concn. of 0.002 μg/ml B_1 0.0006 μg/ml B_2 and G_2. AS

5 C 86

Mycotoxins, a menace of moulds.

Spensley, P. C.

Royal Society of Health Journal 90 (5) 248-54 (1970) [28 ref. En] [Tropical Products Inst., 56-62 Grays Inn Road, London WC1, UK]

After surveying briefly the literature on various mycotoxins, the author presents a more detailed review of aflatoxin, with special reference to its discovery, toxicology, biochemistry, analysis, microbiology (production), occurrence, control, and implications for man. EJM

5 C 87

Use of tracheal organ cultures for bioassay of aflatoxins.

Nair, K. P. C.; Colwell, W. M.; Edds, G. T.; Cardeilhac, P. T.

Journal of the Association of Official Analytical Chemists 53 (6) 1258-63 (1970) [13 ref. En] [Dept. of Vet. Sci., Univ., Gainesville, Florida 32601, USA]

Tracheal organ cultures from day-old chicks were

used for the assay of aflatoxins. Ciliary epithelium in the organ culture was found to be highly sensitive to aflatoxins B and G. Aflatoxin B incorporated into the medium in which the organ cultures were established, readily caused distinguishable cytomorphological changes in 48 h at a concn. of 0.2 μg/ml and complete cessation of ciliary movement at a concn. of 0.5 μg/ml. Aflatoxin G_1 produced the same effects, but at higher concn. (0.5 μg/ml and 2.0-2.5 μg/ml). The degree of cytomorphological changes of the ciliary epithelium in the organ cultures was proportional to the concn. of aflatoxins and the period of time exposed. A dose-response curve was developed for the period of observation. The technique is simple, reproducible, and inexpensive. The feasibility of developing this test system as a biological assay for the presence of aflatoxins and other mycotoxins in feeds and foodstuffs is being explored. AS

5 C 92
Isolation and structure of a biologically reduced aflatoxin B_1.
Robertson, J. A.; Teunisson, D. J.; Boudreaux, G. J.
Journal of Agricultural and Food Chemistry 18 (6) 1090-91 (1970) [6 ref. En] [S. Util. Res. and Development Div., Agric. Res. Service, USDA, New Orleans, Louisiana 70119, USA]

5 C 93
Detection of mycotoxins by thin-layer chromatography: application to screening of fungal extracts.
Scott, P. M.; Lawrence, J. W.; Walbeck, W. van
Applied Microbiology 20 (5) 839-42 (1970) [18 ref. En] [Res. Lab., Food and Drug Directorate, Dept. of Nat. Health and Welfare Tunney's Pasture, Ottawa, Ontario, Canada]

A convenient TLC screening procedure for the detection of 18 mycotoxins is described. AS

5 C 105
[Mycotoxins in foods. IV. Effect of byssochlamic acid, aflatoxin B_1 and luteokyrin on some enzymes.] Mykotoxine in Lebensmitteln. IV. Wirkung von Byssochlaminsäure, Aflatoxin B_1 and Luteokyrin auf einige Enzyme.
Schmidt, I.; Rehm, H.-J.
Zentralblatt für Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, II. Abteilung 125 (5) 520-24 (1970) [16 ref. De, en] [Inst. für Lebensmittelchem., Tech. Hochschule, Munich, W. Germany]

The mycotoxins byssochlamic acid, aflatoxin B_1, and luteoskyrin were tested as to their effect on the activity of 6 enzymes. At a concn. of 10^{-2} M byssochlamic acid inhibited adenosine-deaminase completely, while at a concn. of 10^{-3} M it showed only a weak effect. Alcohol-dehydrogenase and isocitrate-dehydrogenase were inhibited by byssochlamic acid at a concn. of 10^{-2} M. Aflatoxin B_1 and luteoskyrin did not show any effect on the activity of the enzymes tested. A combination of byssochlamic acid and aflatoxin B_1 had no greater influence on alcohol-dehydrogenase, isocitrate-dehydrogenase and adenosine-deaminase. [See FSTA (1969) 1 5C183, (1970) 2 8C190 & 12C272 for parts I, II & III.] AS

5 J 575
[The occurrence of mycotoxins or other active factors in products prepared from contaminated tomatoes.]
Halacka, K.; Polster, M.; Pribela, A.
Vitalstoffe - Zivilisationskrankheiten 15 (3) 92-94 (1970) [5 ref. Fr, de, en] [Inst. of Hygiene, Fac. of Med., Trida Obrancu Miru 10, Brno, Czechoslovakia]

The toxicity of tomato pulp made from fruits contaminated with moulds, chiefly Aspergillus flavus, Penicillium expansum, Fusarium sporotrichiella, Cladosporium herbarum and also other moulds, e.g. Phytophthora infestans was investigated. The affected pulp was distinguished by its dark colour and bitter flavour. Preparative chromatography produced 1 bitter and 3 fluorescent fractions (blue-violet, blue, blue-green) whose absorption spectra and R_f values differed from aflatoxins. Biological tests with white mice and 2-day old ducklings produced liver lesions (lobular centres of inflammation and necroses) which differed from the effects of aflatoxins. Blue fluorescent fraction exhibited strongest toxicity which increased with dose. Toxic effects were produced by quantities corresponding to normal consumption. RM

5 J 670
Aflatoxins: production on beans as affected by temperature and moisture content.
Beuchat, L. R.; Lechowich, R. V.
Journal of Milk and Food Technology 33 (9) 373-76 (1970) [9 ref. En] [Dept. of Food Sci., St. Univ., East Lansing, Michigan 48823, USA]

The suitability of dried navy, pinto, and kidney beans as substrates for the support of growth and aflatoxin production by Aspergillus parasiticus was investigated. Inoculated beans adjusted to 20, 25, or 30% moisture were incubated at 21, 28, or 35°C for 1, 3, or 5 wk. Aflatoxins were produced on all substrates having 25 or 30% moisture when incubation was at 21, 28, or 35°C. Substrates containing 30% moisture and incubated at 28°C supported max. aflatoxin production. There was a decrease in aflatoxin concn. after these maxima were reached. AS

5 M 614
[Sorbic acid and sorboyl palmitate for prevention of aflatoxin formation in bread.] Sorbinsäure und Sorboylpalmitat gegen Aflatoxin-Bildung in Brot.
Groll, D.; Lück, E.
Naturwissenschaften 57 (11) 546-47 (1970) [7 ref. De] [Farbwerke Hoechst AG, Frankfurt (Main)-Höchst, W. Germany]

Sliced pieces of a commercial white bread (with or without 0.13% sorbic acid, or an equivalent amount of sorboyl palmitate) were sprayed with a spore suspension of Aspergillus

flavus. The bread was incubated for up to 11 days in conditions optimal for fungal growth. With reference to the control, the shelf-life of bread containing sorbic acid was extended by 100% and that of bread containing sorboyl palmitate by 180%. Aflatoxin production was also strongly inhibited by the 2 preservatives, particularly by sorboyl palmitate. [See also FSTA (1970) 2 8C191.] MIS

5 M 615
[Effect of sorbic acid and sorboyl palmitate on aflatoxin formation in bread.] Wirkung von Sorbinsäure und Sorboylpalmitat auf die Aflatoxin-Bildung im Brot.
Groll, D.; Lück, E.
Zeitschrift für Lebensmitteluntersuchung und -Forschung 144 (5) 297-300 (1970) [11 ref. De, en]

Fungistatic activity of sorbic acid and sorboyl Germany]
[Farbwerfe Hoechst AG, Frankfurt/M. - Höchst, W. slices of bread which had been inoculated on one palmitate was investigated using 6 cm-thick side only with a spore suspension of aflatoxin-producing Aspergillus flavus and incubated under optimal conditions for aflatoxin production (99% RH, 28°C). Fungal growth in the control group appeared after 3 days, in bread containing 0.13% sorbic acid after 7 days and in bread containing 0.52% sorboyl palmitate after 9 days. Aflatoxin formation was inhibited in parallel with inhibition of fungal growth. A table giving aflatoxin concn. found is included. [See also preceding abstr.] OA

6 R 251
[Effect of aflatoxins on small fresh-water crustaceans.]
Jacquet, J.; Boutibonnes, P.
Bulletin de l'Academie Veterinaire de France 43 (6) 299-309 (1970) [12 ref. Fr] [Lab. Microbiol., Fac. Sci., Caen, France]

A method described for testing the toxicity of aflatoxin to fresh water species of Daphnia, Cyclops and Cypris showed Daphnia pulbex L. to be the most sensitive. Varying concn. of aflatoxin in water (0.01-5 μg/ml) were used to show the range of sensitivity of Daphnia. 1.0 μg/ml aflatoxin gave 100% mortality in 24 h at 20°C. Other concn. (0-10 μg/ml) and time (0-48 h) combinations were studied for other substances secreted by Aspergillus and various toxic materials. The death rate of Daphnia in various concn. of penicillin, sodium chloride, mercuric chloride, potassium cyanide, copper sulphate, thiabendazole and β staphylococcal toxin were studied. To achieve 100% mortality in 24 h the following quantities were required; $CuSO_4$; $HgCl_2$ and aflatoxin 1.0 μg/ml; thiabendazole 10-100 μg/ml; KCN, coumarin 100 μg/ml; NaCl 1.0 mg/ml; penicillin 10 000 IU/ml. It is suggested that a rapid biological test could be developed to confirm results of chromatography; using Daphnia 0.1 ppm aflatoxin could be found in 24 h with a 5 g sample. AE

6 S 645
Aflatoxicosis: the presence of aflatoxins or their metabolites in livers and skeletal muscles of chickens.
Zytveld, W. A. van; Kelley, D. C.; Dennis, S. M.
Poultry Science 49 (5) 1350-56 (1970) [16 ref. En] [Dept. of Infectious Diseases, Coll. of Vet. Med., St. Univ., Manhattan, Kansas 66502, USA]

Aflatoxin was administered to chickens in regulated amounts. 50 g of muscle tissue and entire livers taken from the birds were extracted by chloroform and assayed by TLC. Aflatoxins and/or their metabolites were demonstrated in livers and/or skeletal muscles in 15 of 45 test birds. Toxins were recovered from birds which died early in the experiments or which gained very little weight. No toxins were recovered from control birds. The possible public health significance cannot be disregarded. AS

6 U 428
Current food additives legislation - Namibia.
Food & Agriculture Organization
Current Food Additives Legislation 1969 (123) 1-14 (1969) [En] [Rome, Italy]

Details are given of the Regulations relating to the Standards of Food, Drugs & Disinfectants, 1968, which deal with food additives or contaminants under the following headings: Labelling; Prohibition of unwholesome or poisonous substances in food; Prohibition of articles, devices or appliances used for purposes of adulteration; Preservatives in food; Colouring, flavouring, thickening and artifical sweetening substances in food; Cream; Butter, margarine and ghee; Cheese; Cereals; Baking powder and other leavening substances; Meat and fish preparations - edible fats and edible oils and mineral oils; Mineral oil; Cocoa and chocolate; Custard powder and pudding powder; Curry powder, borric compound and chilli powder; Ginger; Mustard; Pepper; Cloves and other spices; Sauces and chutneys; Jam, conserve, marmalade, fruit-jelly etc.; Sugar, confectionery, dextrose and icing sugar; Fruit juices, diluted, sweetened and diluted, conc., fruit purees and fruit nectars; Fruit syrups, cordials, crushes and squashes; Flavoured beverages or drinks; Aerated or mineral waters; Labelling of flavouring ingredients; Vegetable juices; Preservatives to be used by inspectors; Chewing gum; Vitamins; Honey; Salt; Vinegar; Fungus-produced toxins. [See FSTA (1969) 1 11D618.] AB

7 A 277
Environmental researches at the Laboratory of the Government Chemist.
Lewis, D. T.
Laboratory Practice 20 (1) 24-30 (1971) [29 ref. En, fr, de] [Gov. Chemist's Lab., Cornwall Hous

London SE1, UK]

The Lab. of the Government Chemist is concerned with quality control of foods, drugs, agricultural products, etc. and carries out numerous analytical investigations relating to the quantitative determination of various additives or contaminants in these groups of industrial manufactures. These activities are described under the following headings: food and environment, covering contamination of food and water with poisonous elements (e.g. Pb, As, Hg) and organochlorine and organophosphorus pesticides; natural food contaminants (e.g. aflatoxins); the chemistry of waters and effluents; fluoridation of water supplies; fission product and radionuclide studies; radon-222; and toxic substances in factory atmospheres. A table lists atmospheric contaminants of factories, threshold limits and methods of estimation. JA

7 J 858

Processing of groundnut in India as a source of protein foods.

Chandrasekhara, M. R.; Rao, G. R.; Leela, N.
Indian Food Packer 24 (4) 15-24 (1970) [17 ref. En] [Central Food Tech. Res. Inst.,Mysore-2A, India]

The following topics are discussed in general terms: production of groundnuts in India (5.2 million tonnes in 1966), production of edible groundnut flour, presence of aflatoxin in groundnut cake, production of a high protein multipurpose food, development of Bal-Ahar, Poustik atta, protein isolate, weaning foods, Lactone, infant foods, nutritive value of groundnut protein, and marketing and cost of protein foods based on groundnut flour. PEG

7 J 886

Design and analysis of sampling plans to estimate aflatoxin concentrations in shelled peanuts.

Whitaker, T. B.; Dickens, J. W.; Wiser, E. H.
Journal of the American Oil Chemists' Society 47 (12) 501-04(1970) [4 ref. En] [Biol. and Agric. Eng., St. Univ., College Station, Raleigh, N. Carolina 27607, USA]

Methodology for use in the design and evaluation of sampling plans to estimate aflatoxin concn. in lots of shelled peanuts is presented. Use of the operating characteristic curve for comparing and evaluating processor and consumer risks related to various sampling plans and application of the negative binomial distribution to estimate probabilities associated with sampling lots of shelled peanuts for aflotoxin concn. are discussed. Operating characteristic curves are developed for 2 different single-sample plants, an attribute multiple sample plan, and the plan presently used by the peanut industry to estimate aflatoxin concn. in commercial lots of shelled peanuts. An estimated prior distribution of lots according to aflatoxin concn. is used to predict, among others, such values as the per cent of all lots tested that will be accepted by the sampling plans and the average aflatoxin concn. in the accepted lots. All 4 of the sampling plans described in the paper are compared on the basis of values such as these. Other factors to be considered in the critical evaluation and selection of sampling plans for estimating aflatoxin concn. in commercial lots of shelled peanuts are discussed. AS

7 M 802

Survey of corn for aflatoxin, zearalenone and ochratoxin.

Shotwell, O. L.; Hesseltine, C. W.; Goulden, M. L.; Vandegraft, E. E.
Cereal Chemistry 47 (6) 700-07 (1970) [12 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

A total of 283 corn samples from commercial markets, including samples from all grades ,from the crop year 1967, were assayed for the presence of aflatoxin, ochratoxin, and zearalenone. Samples were extracted and assayed by the procedure developed by the FDA for multitoxin analysis. The sensitivity limits of the analysis as carried out were 1-3 parts per billion (ppb) aflatoxin B-1 and G-1, 50 ppb ochratoxin A, and 200 ppb zearalenone. 6 of the samples (5 in sample grade (SG) and 1 in grade 3) contained aflatoxin in low levels. One SG corn contained ochratoxin A. Zearalenone was identified in 2 SG samples, and F-3, an oestrogenic factor related to zearalenone, could also be present. AS

7 P 1084

Determination of aflatoxins B and M_1 in milk.

Jacobson, W. C.; Harmeyer, W. C.; Wiseman, H. G.
Journal of Dairy Science 54 (1) 21-24 (1971) [7 ref. En] [Div. of Vet. Res., Dept. of Health, Education and Welfare, Beltsville, Maryland 20204, USA]

Cows fed contaminated rations containing the mould metabolite aflatoxin B_1 secrete low levels of aflatoxin B and its metabolite aflatoxin M_1 in milk. To establish the relationship between ingested and milk-secreted aflatoxin, a sensitive method is needed to determine aflatoxins B and M_1 in milk. A method is presented by which good recoveries, within the limits of visual comparison, were obtained from samples containing 0.5 parts aflatoxin per thousand million. Deproteinized milk (80% methanolic filtrates) was adjusted to 50% by addition of 4% salt solution and defatted by extraction with hexane. Aflatoxins were extracted from the alcoholic phase with chloroform which was removed in vacuo. The residue was dissolved in benzene/hexane (1:1) and chromatographed on a partition column of Celite coated with an aqueous solution of $CaCl_2$ to separate aflatoxins B and M_1. The eluted B was passed through another partition column of Celite coated with methanol/water (1:1) for additional cleanup. Aflatoxin eluates were dissolved in chloroform and spotted on TLC plates for fluorescence comparisons. AS

7 P 1134
[Detection of aflatoxins in cheese.] Zum Nachweis von Aflatoxinen in Käse. [A lecture]
Kiermeier, F.
Zeitschrift für Lebensmitteluntersuchung und -Forschung 144 (5) 293-97 (1970) [11 ref. De, en]
[Inst. für Milchwissenschaft, Weihenstephan, W. Germany]

The demonstrated formation of aflatoxin in cheese incubated with aflatoxin-producing moulds suggested that it may arise also by adventitious infection in commercial cheese especially when long stored. Aflatoxin where present is usually concentrated in the superficial layers of the cheese. Its detection presents difficulties owing to the presence of interfering substances formed during ripening. A satisfactory scheme of detection and estimation of general application is proposed, based on TLC of a cold acetonitrile extract of an appropriately located cheese sample. Confirmatory tests for the toxin and a procedure for its quantitative estimation are outlined. GTP

8 C 132
[Veterinary aspects of chemical contamination of foods of animal origin.] [A review]
Tiecco, G.; Valfre, F.
Atti della Societa Italiana delle Scienze Veterinarie 24: 55-176 (1970) [652 ref. It]
[Istituto Superiore di Sanita, Rome, Italy]

The review covers antibiotics, pesticides, mycotoxins, oestrogens and antithyroid agents. JI

8 C 134
Improved separation of aflatoxins by vapour-programmed thin layer chromatography and controlled relative humidity.
Zeeuw, R. A. de.; Lillard, H. S.
Journal of the Association of Official Analytical Chemists 54 (1) 98-101 (1971) [12 ref. En]
[Richard B. Russell Agric. Res. Centre, USDA, Agric. Res. Service, Athens, Georgia 30604, USA]

Vapour-programmed thin layer chromatography (TLC) was found to give distinctly improved separations of the 4 common aflatoxins, B_1, B, G_1 and G. Fluorodensitometric evaluation of the chromatograms showed completely separated peaks with the recorded curve always coming back to the baseline. Both classical TLC separations and VP-TLC separations were highly dependent on the RH under which the analysis was performed. Optimum resolutions thus require the availability of a room with controlled and variable RH. However, when the VP-TLC technique is used, changes in RH can be compensated for by suitably altering the vapour programme. AS

8 C 137
Thin-layer chromatography of aflatoxins.
Reddy, T. V.; Viswanathan, L.; Venkitasubramanian, T. A.
Analytical Biochemistry 38 (2) 568-71 (1970) [9 ref. En] [Biochem. Dept., Vallabhbhai Patel Chest Inst., Univ., Delhi-7, India]

A new solvent system for separation of aflatoxins B_1, B, G_1 and G by one-dimensional TLC is described. The solvent system contains toluene or xylene, isoamyl alcohol or tertiary amyl alcohol and methanol. Using a toluene/isoamyl alcohol/methanol (90/32/3) system the Rf values of aflatoxin B_1, B, G_1 and G (from aflatoxin mixture or chloroform extract of Aspergillus parasiticus) were 0.56, 0.48, 0.42 and 0.34 respectively. These solvents are less sensitive to varying conditions, e.g. purity of the solvents, than the current solvent system of chloroform/methanol (98/2). The solvent and method described have been valuable in quantitative and qualitative work with contaminated wheat and rice. CECV

8 C 140
Aflatoxin G_1 metabolism by Rhizopus species.
Cole, R. J.; Kirksey, J. W.
Journal of Agricultural and Food Chemistry 19 (2) 222-23 (1971) [7 ref. En] [Nat. Peanut Res. Lab., USDA, Peanut Quality Investigations, Forrester Drive, PO Box 637, Dawson, Georgia 31742, USA]

Biological degradation of aflatoxins has aroused considerable interest because of implications in detoxification of feeds and foodstuffs. Rhizopus stolonifera, R. arrhyzus, R. oxyzae, and R. sp. degraded aflatoxin G_1. An intermediate in biological degradation was isolated and identified as a previously reported metabolite of Aspergillus flavour (aflatoxin B_3) and Asp. parasiticus (parasiticol). Radioisotope data conclusively demonstrated that this metabolite was derived from aflatotin G_1 degradation by Rhizopus spp. AS

8 C 141
Uptake of aflatoxin B_1 by plastics materials.
Scoppa, P.; Marafante, E.
Experientia 27 (4) 414-15 (1971) [7 ref. En]
[Biol. Div., CCR Euratom, Ispra, Italy]

11 different materials (silicone, Tygon, PVC, polyethylene Plexiglass, cellulose ester, Cellotate, nylon, regenerated cellulose, Teflon and Parfilm) were exposed to aflatoxin solutions containing various amount of aflatoxin for periods up to 6 h. % adsorption of aflatoxin after 6 h ranged from 1 to 88%, with 12 of the 17 samples involved adsorbing >30%. It is concluded that uptake of aflatoxin by soft plastics materials is a rapid and widespread phenomenon. HBr

8 C 142
Inactivation of aflatoxins in peanut and cottonseed meals by ammoniation.
Gardner, H. K., Jr.; Koltun, S. P.; Dollear, F. G.; Rayner, F. T.
Journal of the American Oil Chemists' Society 48 (2) 70-73 (1971) [27 ref. En] [S. Regional Res. Lab., New Orleans, Louisiana 70119, USA]

Aflatoxins in peanut and cottonseed meal can be inactivated by treatment with gaseous NH_3. In pilot plant runs, contaminated peanut meal was ammoniated at 2 levels of moisture content, (9 and 15%), reaction time (15 and 30 min, temp. (150 and 200 F) and NH_3 pressure (15 and 30 lb/in^2 gauge. TLC indicated that ammoniation i

the aflatoxins (121 parts/billion) in the meal to a nondetectable level. With similar treatment, total aflatoxins (350 parts/billion) in cottonseed meal were reduced to 4 parts/billion. A series of runs was made with large scale equipment using cottonseed meal containing an average of 510 parts/billion total aflatoxins. Under optimum processing conditions, aflatoxin content of this meal was reduced to <5 parts/ billion and non-detectable levels. AS

8 J 979
[Decontamination process for food products containing aflatoxin, particularly products containing oil or fat, e.g. nut kernels, or cereals and cereal products.] Verfahren zur Entgiftung von Aflatoxin enthaltenden, insbesondere öl- oder fetthaltigen Lebensmitteln, wie z.B. Nusskernen, oder Getreide bzw. Getreideprodukten.
Hanssen, H.; Bahlsen, W.
West German Patent Application 1 914 095 (1970) [De]

Food products, particularly peanuts, are washed with water at <100°C or treated with wet steam for ~1 min. Then they are sprayed with 10°C mains water, to rinse away the dissolved aflatoxin, and dried to 5-7% moisture content at <100°C, preferably ~60°C. During treatment, the product may be subjected to vibrations or ultrasonic waves of a frequency of 20-30 kHz. W&Co

8 M 869
A multimycotoxin detection method for aflatoxins, ochratoxins, zearalenone, sterigmatocystin, and patulin.
Stoloff, L.; Nesheim, S.; Yin, L.; Rodricks, J. V.; Stack, M.; Campbell, A. D.
Journal of the Association of Official Analytical Chemists 54 (1) 91-97 (1971) [19 ref. En] [Div. of Food Chem. and Tech., FDA, Washington, DC 20204, USA]

In response to the need for a more comprehensive and simple procedure for multiple mycotoxon detection than had heretofore been devised, a method has been developed for detection of aflatoxins B_1, B_2, G_1 and G_2, ochratoxins A and B and their ethyl esters, zearalenone, sterigmatocystin, and patulin. The method is based on selective extraction with acetonitrile-water, defatting with isooctane, and removal of water-soluble components by transfer of the mycotoxins to chloroform. The method has been applied to corn, barley, oats, and wheat. The detection limits achieved are not as low as can be attained with the analytical procedures for the individual mycotoxins, but are low enough to be useful in a screening procedure. AS

8 M 871
Infrared detection of Aspergillus parasiticus growth on moist sorghum grain.
Banks, J. C.; Lynd, J. Q.
Agronomy Journal 63 (2) 340-342 (1971) [5 ref. En] [Agric. Expt. Sta., St. Univ., Stillwater, Oklahoma 74074, USA]

A method is presented for detecting Asp. parasiticus, Speare, growth on sterile moist sorghum grain using a dual lens IR source and an IR scope with Type 413 IR Polaroid film recordings. Yellow to pale green "halo" patterns on inoculated whole grain were apparent with the IR scope 12-24 h before visible mycelial development and aflatoxin formation. Highest B_1 and G_1 aflatoxin levels occurred with 120-144 h incubations at 30°C in saturated humidity. AS

8 N 326
A method for detection of aflatoxins B_1 and B_2 in toasted cottonseed meal.
Yin, L.; Campbell, A. D.; Stoloff, L.
Journal of the Association of Official Analytical Chemists 54 (1) 102-05 (1971) [6 ref. En] [Div. of Food Chem. and Tech., FDA, Washington, DC 20204, USA]

The detection limit for aflatoxins B_1 and B_2 in toasted cottonseed meal by the presently accepted analytical method is ~1000 μg/kg. A procedure that reduces the limit to ~5 μg/kg is described. The sample is extracted with aqueous acetonitrile and n-hexane. Interferences are removed from the acetonitrile phase of the extract by precipitation with lead acetate, liquid-liquid partition with water/acetonitrile-chloroform, and silica gel column chromatography. Aflatoxins B_1 and B_2 in the extract can be separated from the residual interfering fluorescent materials by 2-dimensional TLC. This procedure is qualitative only and is capable of detecting aflatoxin B_1 or B_2 in toasted cottonseed meal contaminated with amounts ⩾5 μg,kg of either aflatoxin. Loss of aflatoxin B on toasting naturally contaminated cottonseed is observed. When toasting is carried out at 180-185°C for 3 h, almost complete loss of aflatoxin B and partial loss of aflatoxin B_2 are observed by means of the procedure described. AS

8 N 376
Mycoflora, aflatoxins and free fatty acids in California cottonseed during 1967-1968.
Ashworth, L. J., Jr.; McMeans, J. L.; Houston, B. R.; Whitten, M. E.; Brown, C. M.
Journal of the American Oil Chemists' Society 48 (3) 129-33 (1971) [12 ref. En] [Dept. of Plant Pathology, Univ., Berkeley 94720, California, USA]

In central California, neither fungal infections nor aflatoxins are significant problems in cottonseed during the receiving and storage seasons. However, in southern California, the 1967 harvest contained a relatively high percentage of seed which were invaded before harvest by fungi, including Aspergillus flavus. Seed infection and concn. of aflatoxins in seed increased significantly during the time between harvest and storage in southern California. For a short time during storage, seed infection by Asp. flavus increased because of the moisture the seed received late in the season; however, aflatoxin concn. in seed did not increase in storage. The aflatoxin content of the seed removed from storage was a reflection of the relative amount of aflatoxins the seed contained when they were received for storage. In 1967, the conditions that existed in the large, densely packed seed pile did not favour accumulation of aflatoxins in seed, even though Asp. flavus was active. AS

8 S 970
[Aflatoxin production in salami-type sausages by several Aspergillus flavus strains and one Aspergillus parisaticus strain.]
Aflatoxinbildung in Rohwurst durch verschiedene Aspergillus flavus-Stämme und einen Aspergillus parasiticus-Stamm.
Leistner, L.; Tauchmann, F.
Fleischwirtschaft 50 (7) 965-66 (1970) [18 ref. De, en]

Dry sausages were inoculated with 13 strains of Asp. flavus and 1 strain of Asp. parasiticus. The sausages (Jägersalami) were incubated at 25°C and high RH. After 10-18 days storage the sausages were held for 30 min in steam and aflatoxins determined quantitatively. 4 strains produced very large, 5 strains medium and 5 other strains small amounts of aflatoxins. Aflatoxins G_1 and B_1 predominated while G_2 was detected in small amounts and B_2 in traces only. It is concluded that under favourable temp. and humidity conditions some strains of Asp. flavus and Asp. parasiticus may produce large amounts of aflatoxins. FWJ

9 C 151
[Mycotoxins as a food hygiene problem.] [A review]
Korpinen, E.-L.
Suomen Eläinlääkärilehti 77 (4) 172-79 (1971) [27 ref. Fi, en]

Occurrence of mycotoxins in foods is reviewed, with particular reference to aflatoxin, ergotoxin, the Fusarium toxins and the yellow rice toxins. Their significance as a general food hygiene problem is discussed. HBr

9 J 1173
Drying farmers' stock peanuts at 40 and 60°F.
Woodward, J. D.; Hutchison, R. S.; Davidson, J. I., Jr.
Transactions. American Society of Agricultural Engineers 13 (4) 444-47 (1970) [9 ref. En]

Effect on various quality factors of drying peanuts at low temp., and the practicality of low temp. drying were investigated. Tests were run during 2 seasons using different equipment and at temp. 40 and 60°F, and compared with controls dried at ambient air temp. or at 95°F. Air δ low rates of 5, 10 and 20 ft^3/min/ft^3 of peanuts and RH of 14-65% were tested. Only 2 of 132 test samples contained small quantities of aflatoxin (10 and 14 parts/billion at both temp.) and only 1 of controls (95°F, 5 parts/billion), suggesting that harvesting with immediate drying may have been more important than method of drying. Flavour ratings were lower at the top of the bins during one season, not affected by location during the next season and did not vary with temp. and air flow rates, but were better in controls. Germination was higher in lower part of bin, also for nuts harvested at 30% moisture and at 95°F. No consistent effect on free fatty acid content was observed. Analysis of milling quality indicated higher % of split kernels in peanuts dried with low-humidity air. RM

9 P 1438
[Hygiene of liquid milk and milk products.]
Giolitti, G.
Scienza dell' Alimentazione 1[illegible] (7) 241-47 (1970) [It] [Istituto di Ispezione degli Alimenti di Origine Animale, Univ., Milan, Italy]

This review-type article quotes numerous authors in the text, but no bibliography is appended. The subject is discussed under the headings: pathogenic schizomycetes and their toxins: presence of mycotoxins; presence of insecticide residues; presence of radioactive elements; presence of pharmaceutical product residues; presence of herbicide residues; and containers. HBr

10 A 440
[Taxonomic studies on the Japanese industrial strains of Aspergillus. XII. Pink coloration of conidia by anisic acid and the related compounds, re-examination of the production of kojic acid and aflatoxin and the determination of decomposition of hydrogen peroxide.]
Murakami, H.; Hara, S.; Takahashi, T.; Ryi, G.; Ohba, T.; Suito, K.; Takano, F.
Report of the Research Institute of Brewing [Jozo Shikenjo Hokoku] 1970 (142) 1-14 (1970) [13 ref. Ja, en] [Res. Inst. Brewing, Takinogawa, Kita-ku, Tokyo, Japan]

The pink coloration of many strains were compared with one another when they were cultured in various media containing anisyl alcohol, anisaldehyde, anisic acid and anisole and the results for 426 strains are shown schematically. Anisaldehyde and anisic acid seemed to be useful for the classification of moulds as their representatives. To select a favourable medium from the point of view of kojic acid production, for the classification of moulds based upon the discrimination between A. oryzae and A. flavus, 15 kinds of media were examined. Rice-koji extract (Balling 6-8) and rice-hydrolysate by Takadiastase (Balling 10) were selected as useful. 27 strains were selected as more or less similar in aflatoxin production and the aflatoxin productivity was studied by the same method as that of previous reports [See J. Gen. Appl. Microbiol. (1967) 13 323-334; (1968) 14 97-110; (1968) 14 251-262]. Some spots similar to those of aflatoxins in thin-layer chromatogram were found in 5 strains and the same UV-absorption spectrum as that of aflatoxins was shown only by a strain RIB 1037, which was received in 1967 from Raper as a type culture of A. parasiticus Speare WB 465. In order to facilitate the determination of decomposition of H_2O_2, a method by Euler and Josephson was examined for some strains and found to be suitable for this purpose. [See FSTA (1971) 3 4H456 for part XI.] YN

10 A 441
[Taxonomic studies on the Japanese industrial strains of Aspergillus. XIII. Distribution of various mycological characters in all of the strains and some important characters.]
Murakami, H.
Report of the Research Institute of Brewing [Jozo Shikenjo Hokoku] 1970 (142) 15-24 (1970) [6 ref. Ja, en] [Res. Inst. Brewing, Takinogawa, Kita-ku, Tokyo, Japan]

The mycological characters of 426 strains of koji-mould were discussed, including the A. flavus-oryzae group of Thom and Church, and the A. fl

group of Raper and Fennell. Mycological differences between A. oryzae and A. flavus were generally found to lie in the following characters: production of sclerotia; seriation of sterigmata; roughness of conidial walls; pink coloration of conidia in a medium containing anisic acid; browing of the rice-koji; reduction of methylene blue and production of amylase; and colour of the old slant culture. The 2 groups of strains were divided into 8 groups each from A to H and I to P, based upon the combination of 3 principal characters for each group: production of kojic acid, coloration of conidia by anisic acid and browning of rice-koji; or coloration of conidia by anisic acid, production of kojic acid and biseriate sterigmata. The great majority of A. oryzae and koji-moulds seemed to belong to the groups of A, E and F and to those of K, I and L respectively; while the A. flavus strains were distributed fairly evenly in almost every group, which suggests the presence of some taxonomic confusion in A. flavus. YN

10 A 442

[Taxonomic studies on the Japanese industrial strains of Aspergillus. XV. Component analysis of 20 mycological characters of 406 strains.]

Murakami, H.

Report of the Research Institute of Brewing [Jozo Shikenjo Hokoku] 1970 (142) 32-51 (1970) [Ja, en] [Res. Inst. Brewing, Takinogawa, Kita-ku, Tokyo, Japan]

20 principal characters of 406 strains were analysed by a component analysis, including 361 koji-moulds and 45 strains of the so-called A. flavus. The A. flavus groups of Raper and Fennell and of aflatoxin producer were all received from abroad. All strains can be divided into 2 large clusters consisting of an independent cluster GG and the other remaining clusters. The GG include the strains having biseriate sterigmata in addition to the smaller conidia and producing kojic acid and is discriminated from the G having the large conidia. A taxonomical difference between A. flavus and A. oryzae seems to lie in that of the clusters between the GG and the remaining ones. The great majority of strains can be included in 2 clusters, E and EE, based on the difference of colour (green and brown respectively), of old slant cultures in Czapek's agar. The size of conidia also seems to be a good character to discriminate between these strains. YN

10 C 182

[Toxin-forming moulds in some imported foods.]

Burzynska, H.

Roczniki Panstwowego Zakladu Higieny 22 (2) 133-146 (1971) [40 ref. Pl, ru, en] [Zaklad Badania Zywnosci i Przedmiotow Uzytku Panstwowego Zakladu Higieny, Warsaw, Poland]

124 strains of Aspergillus, Penicillium, Mucor, Trichothecium and Cladosporium spp. were isolated from 74 samples of foods imported into Poland, viz. peanuts, walnuts, hazel nuts, cocoa beans, cocoa, figs, rice, rye and sesame seeds. Asp. flavus was the only strain to produce aflatoxins; this was isolated from the peanuts, walnuts, cocoa beans, cocoa and rye. HB

10 C 183

Food-borne infections and intoxications. [A book]

Riemann, H. (Editor)

xxviii+698pp. (1969) [Numerous ref. En] London, UK: Academic Press Inc., Ltd. [Dept. of Epidemiology and Preventive Med., School of Vet. Med., Univ., Davis, California, USA]

This book, fifth in the series of Food Science and Technology Monographs, is divided into 3 sections: Food-borne infections; Intoxications of microbial origin; and Miscellaneous (including plant and animal toxins etc.). The following chapters are included: Salmonella and Arizona infections, by J. Taylor and J. H. McCoy (pp. 3-72, numerous ref.); Viral infections, by D. O. Cliver (pp. 73-113, numeous ref.); Halophilic Vibrio infections, by R. Sakazaki (pp. 115-29, 32 ref.); Clostridium perfringens and Bacillus cereus infections, by B. C. Hobbs (pp. 131-73, numerous ref.); Parasitic infections, by G. R. Healy & N. N. Gleason (pp. 175-222, numerous ref.); Infections due to miscellaneous microorganisms, by F. L. Bryan (pp. 223-87, numerous ref.); Botulism - Types, A, B, and F, by H. Riemann (pp. 291-327, numerous ref.); Botulism - Type E, by G. Sakaguchi (pp. 329-58, 72 ref.); Staphylococcal intoxications, by R. Angelotti (pp. 359-93, numerous ref.); Alimentary mycotoxicoses, by G. N. Wogan (pp. 395-451, numerous ref.); Laboratory methods, by T. H. Silliker & R. A. Greenberg (pp. 455-87, 65 ref.); Food processing and preservation effects, by H. Riemann (pp. 489-541, numerous ref.); and Poisonous plants and [illegible], by H. G. Scott (pp. 543-604, numerous ref.) [illegible]G

10 C 191

A procedure for rapid recovery of aflatoxins from cheese and other foods.

Shih, C. N.; Marth, E. H.

Journal of Milk and Food Technology 34 (3) 119-123 (1971) [20 ref. En] [Dept. of Food Sci., Univ., Madison, Wisconsin 53706, USA]

The method is based on the 20°C phase diagram for (i) water/ (ii) methanol/ (iii) chloroform system. The sample (100 g) is blended with (i) (including water in the product) + (ii) + (iii) in such proportions (typically 80, 200 and 100 ml, respectively, for brick cheese) as to obtain a miscible system, followed by separate addition of further (i) and (ii) (typically 100 ml of each for brick cheese) to obtain a binary solvent system, and extraction of aflatoxins in (iii) layer. Extract is dried over Na_2SO_4, conc. to 2-3ml, made up to 10 ml with (iii) and analysed by TLC when the product contains little lipid or pigment. When extract contains substances interfering with TLC it is further purified, after evaporation under reduced pressure on a steam bath, by separate addition, with shaking, of (ii) + (i) + (iv) hexane (50:45:120 v/v/v), and the lower (i + ii) layer removed and extracted 3× with (iii) (each portion equal in vol. to the (ii) used for purification). Traces of aflatoxin are recovered by single extraction of (iv) layer with (ii + i) (50:45 v/v) and extraction of (i + ii) mixture 3× with (iii). All (iii) extracts are combined,

evaporated to 2-3 ml, made up to 10 ml with (iii) and analysed by TLC. Recoveries of aflatoxins B_1, B_2, G_1 and G_2 from 50 g samples of brick cheese in 3 experiments were in the ranges 91.0-$\geqslant$100, 91.4-$\geqslant$100, 90.0-95.5 and 91.9-$\geqslant$100, respectively. Satisfactory recoveries were made from other substrates, suggesting that the method is suitable for recovery of aflatoxins from foods other than cheese provided the (iii):(ii):(i) ratio is 25:50:20 before, and 50:50:45 v/v/v after dilution. BEPC

10 J 1347
Fate of aflatoxin during roasting and storage of contaminated peanut products.
Waltking, A. E.
Journal of the Association of Official Analytical Chemists 54 (3) 533-539 (1971) [12 ref. En] [Best Foods Res. Center, CPC International, Inc., 1120 Commerce Ave., Union, New Jersey 07083, USA]

A study of the effects of pilot plant roasting of contaminated peanuts showed an average loss, after roasting, of 40-50% of the B_1 and G_1 aflatoxins and 20-40% of the B_2 and G_2 aflatoxins originally present. Portions of both the raw and roasted products (peanut butters prepared with commercially rejected peanuts) were stored in both paper bags and air-tight glass jars and periodically reassayed for aflatoxin. No significant change in aflatoxin content was found after 3 months of storage at 75°F regardless of the container. However, significant reduction of aflatoxins was observed in other aflatoxin-contaminated peanut products which had been stored at room temp. for over 1 yr. AS

10 K 124
Collaborative study of a method for the analysis of cocoa beans for aflatoxins.
Scott, P. M.; Przybylski, W.
Journal of the Association of Official Analytical Chemists 54 (3) 540-544 (1971) [6 ref. En] [Food and Drug Directorate, Dept. of Nat. Health and Welfare, Ottawa 3, Ontario, Canada]

Results from 10 collaborating laboratories were used to evaluate a method for the determination of aflatoxins in cocoa beans. 2 types of raw cocoa bean, one from Trinidad and one from Chana, were intentionally contaminated with aflatoxins at levels of 8-35 μg/kg. Mean recoveries of all aflatoxins from all samples ranged from 57 to 104%; mean recoveries of aflatoxin B_1 from Ghana cocoa beans were 83-97%. The method has been adopted as official first action. [See also FSTA (1969) 1 7C300.] AS

10 M 1148
Biochemical and functional changes in stored cereal grains. [A review]
Pomeranz, Y.
CRC Critical Reviews in Food Technology 2 (1) 45-80 (1971) [63 ref. En] [Nat. Barley & Malt Lab., USDA, Madison, Wisconsin, USA]

After a description of kernel structure, dormancy, and germination of grains, recent investigations on the desirable changes in functional properties of grains stored under normal conditions, biochemical and functional changes in cereals stored under adverse conditions and attacked by moulds, and on toxins produced by fungi in storage-damaged cereals, are reviewed. PEG

10 M 1149
[The mycotoxins. A present day problem.]
Jemmali, M.
Meunerie Francaise 274: 9-14 (1971) [15 ref. Fr] [Lab. de mycotoxines, Sta. de Biochimie et Physicochimie des Cereales, INRA, 16 rue Nic Fortin, Paris-13e, France]

Conditions suitable for development of moulds, and in particular of Aspergillus flavus, on cereals for production of toxins are discussed with reference to temp., RH, composition of the substrate and treatment of the product. A survey is given of: the occurrence of mouldy feed toxicosis, Stachybotrys toxicosis, alimentary toxic aleukia and mouldy corn toxicosis; toxin-producing mould species; suitable substrates; hosts; and symptoms of the diseases. MDB

10 M 1150
Occurrence of aflatoxin producing strains of Aspergillus flavus Link in stored corn.
Richards, J. L.; Cysewski, S. J.
Mycopathologia et Mycologia Applicata 44 (3) 221-229 (1971) [11 ref. En] [Agric. Res. Service, USDA, Ames, Iowa, USA]

25 samples of mouldy shelled maize were analysed for aflatoxin using both TLC and duckling bioassay. Extracts of 11 of the maize samples gave fluorescent spots indicative of aflatoxin on TLC analysis, but duckling bioassay tests proved negative. However, extracts of 7 of 15 cultures of Asp. flavus isolates, obtained from 12 of the 25 mouldy maize samples, produced hepatic lesions typical of aflatoxin poisoning, besides being positive in the TLC test. EJM

0 M 1169
[Growth of Aspergillus flavus and production of aflatoxin in sliced and packed whole wheat bread.]
Wachstum von Aspergillus flavus und Aflatoxinbildung in geschnittenem und verpacktem Weizenvollkornbrot.
Reiss, J.
Zeitschrift für Lebensmitteluntersuchung und -Forschung 145 (3) 155-158 (1971) [14 ref. De, en] [Mikrobiol. Lab., Grahamhaus Studt KG. Bad Kreuznach, W. Germany]

Slices of bread baked from whole flour and wrapped in O_2-proof cellophane (MXT 45 [illegible] inoculated with an aflatoxin-producing strain [illegible] Aspergillus flavus and growth and aflatoxi[illegible] production deter[illegible]

[illegible] growth of my[illegible] and spores and co[illegible] synthesis of aflatoxin. As the supply of O_2 decreased, spore capsule formation dec[illegible] rapidly and no more aflatoxin was p[illegible] [illegible]les of unwrapped bread the largest quanti[illegible] aflatoxin was detected in the mycelium o[illegible] [illegible] while no aflato[illegible] or [illegible] DI

11 A 517
[A quantitative detection of aflatoxins by [illegible] plates.] Quantitativer Nachweis der Aflatoxine durch photofluorometrische Bestimmung direkt von Dünnschichtplatten.
Toth, L.; Tauchmann, F.; Leistner, L.
Fleischwirtschaft 50 (9) 1235-123[illegible] (1970) [11 ref. De, en]

Experiences with the AMINCO spectrophotofluorometer in the quantitative assay of aflatoxins are reported. FWJ

11 B 118
[Aspergillus flavus, an important mycotoxin producer.] Aspergillus flavus, ein bedeutender Mykotoxinproduzent. [A review]
Buntenkötter, S.
Deutsche Tierärztliche Wochenschrift 78 (10) 309-313 (1971) [87 ref. De] [Tierärztliche Hochschule, Hanover, W. Germany]

11 C 202
Factors affecting the production [illegible].
[A lecture]
Jarvis, B.
Journal of Applied Bacteriology 34 (1) 199-213 (1971) [81 ref. En] [Nat. Coll. of Food Tech., St. George's Ave., Weybridge, Surrey, UK]

Although the physical, chemical and biological factors influencing the ecology of mycotoxicosis outbreaks can be evaluated in general terms, specific ecological factors affecting toxin production are often unknown. Studies with lab. media have shown that optimum toxin production often occurs at suboptimal growth temp., and even at sub-zero temp. in some cases. Toxin production is generally successful in laboratory studies using natural substrates. Many fungi grow well on chemically-defined media but require supplements such as yeast extract, malt extract or peptone for optimal toxin production. The ability of a particular species to produce toxin shows considerable strain variation. There is evidence for both synergism and antagonism between species of mycotoxic fungi when they are cultured together. The significance of mycotoxic fungi to man, and the validity of contemporary toxicity tests in relation to human responses are discussed. BAL

11 H 1743
[Metabolic products of fungi in fruit juices and concentrates.] Stoffwechselprodukte der Schimmelpilze in Fruchtsäften und -konzentraten. [A review]
Fechmann, K. H.
Archiv für Lebensmittelhygiene 22 (6) 126-129 (1971) [5[illegible] ref. De] [Microbiol. Lab., Bactotox AG, CH 8172 Niederglatt, Switzerland]

The subject is reviewed with particular reference to effects of temp. and moisture on fungal growth, nutritional requirements of fungi, fungal spp. found in fruit juices, metabolic products (aflatoxins), and toxicity of mycotoxins. [illegible]

11 P 1931
Abstracts of papers to be presented at the Sixty-Sixth Annual Meeting, Michigan State University, East Lansing, June 20-23, 1971. Manufacturing section. Bacteriology.
United States of America, Dairy Science Association
Journal of Dairy Science 54 (5) 748-750 (1971) [En]

The following papers are included in this section: Isolation of an antibiotic from Lactobacillus bulgaricus, by G. V. Reddy & K. M. Shahani (M1); Staphylococcal enterotoxin A development in Cheddar cheese slurries, by N. R. Gandhi & G. H. Richardson (M2); Chemical mutation of Streptococcus lactis, by D. C. Westhoff (M3); Plating medium pH as a factor in apparent survival of sublethally stressed yeasts, by F. E. Nelson (M4); Growth of salmonellae in skim-milk fortified with antibiotics, by H. S. Park & E. H. Marth (M5); Aflatoxin produced experimentally in brick cheese, by C. N. Shih & E. H. Marth (M6); Effect of 3 insecticides on morphology of Lactobacillus bulgaricus, by D. D. Deane & R. A. Jenkins (M7); Growth and heat resistance of Bacillus stearothermophilus ATCC 7953 in infant formulas, by E. M. Mikolajcik, D. B. Chawan & A. A. Quraishi (M8); Inactivation of Salmonella typhimurium by sorbic acid, by H. S. Park & E. H. Marth (M9); and Assay of the heat-inactivation of immunoglobulins in milk systems, by E. M. Mikolajcik & D. P. Sinha (M10). CDA

12 C 217
Aflatoxin removal.
Mann, G. E.; Codifer, L. P., Jr.; Gardner, H. K., Jr.; Dollear, F. G. (United States of America, Secretary of Agriculture)
United States Patent 3 585 041 (1971) [En]

Process in which agricultural products contaminated with aflatoxin are mixed with methylamine and held at a temp. of 75-100°C to reduce the aflatoxin level. IFT

12 C 218
Liquid chromatography of aflatoxins including aflatoxins B_{2a} and G_{2a}.
Manabe, M.; Matsuura, S.
Agricultural and Biological Chemistry 35 (3) 417-423 (1971) [9 ref. En] [Food Res. Inst., Ministry of Agric. and Forestry, 1-4 Shiohama, Koto-ku, Tokyo, Japan]

Separation of aflatoxins by liquid chromatography was studied. Sephadex G-10 and its specially prepared carboxymethyl derivative, Sephadex G-10 (CM), with water as eluent gave better results than CM Sephadex A-25, DEAE Sephadex A-25 or CM cellulose. Aflatoxins G_{2a}, B_{2a}, G_2, B_2, G_1 and B_1 were eluted in that order. RM

12 C 221

Aflatoxins: their nature and biological effects. [A review]

Kumar, G. V.; Sampath, S. R.

Indian Journal of Nutrition and Dietetics 8 (2) 85-101 (1971) [91 ref. En] [S. Regional Sta., Nat. Dairy Res. Inst., Bangalore, India]

A review is given of available information on the nature and biological effects of aflatoxins under the following headings: formation of aflatoxins in agricultural commodities; chemical nature, biochemical effects; carcinogenic effects; myocotic abortions; aflatoxicosis - its symptoms and treatment; and the prevention of the development of the toxin and its detoxification. MHEG

12 C 222

[Aflatoxins.]

Lancillotti, F.; Lucisano, A.

Industria Conserve 46 (2) 111-123 (1971) [230 ref. It, fr, en, de] [Sta. Sperimentale per l'Ind. delle Conserve Alimentari, Parma, Italy]

The numerous papers on food contamination by aflatoxins which have been published since 1961 are critically discussed. Particular emphasis is laid on the effects of aflatoxins in animals, the types of food substrates susceptible to contamination, the factors affecting the production of aflatoxins by moulds, and the chemical and biological methods that can be used for detoxification and for the determination of aflatoxins in foods. AS

12 C 225

Evaluation of reflectance fluorodensitometry for measuring aflatoxins on thin layer plates.

Pons, W. A., Jr.

Journal of the Association of Official Analytical Chemists 54 (4) 870-873 (1971) [7 ref. En] [S. Regional Res. Lab., New Orleans, Louisiana 70119, USA]

12 C 229

[Obtaining purifying and identifying aflatoxin B_1.]

Pokrovskii, A. A.; Nikolaeva, M. Ya.; Nefed'eva, N. P.; Bogoroditskaya, V. P.

Voprosy Pitaniya 30 (4) 69-73 (1971) [20 ref. Ru, en] [Lab. Med. Enzimologii, Inst. Pitaniya AMN SSSR, Moscow, USSR]

12 J 1495

Collaborative study of a modified method for the determination of aflatoxins in copra, copra meal, and coconut.

Baur, F. J.; Armstrong, J. C.

Journal of the Association of Official Analytical Chemists 54 (4) 874-878 (1971) [4 ref. En] [Proctor & Gamble Co., 6071 Center Hill Rd., Cincinnati, Ohio 45224, USA]

A collaborative study, in which 19 laboratories participated, was conducted on a modified method for the determination of aflatoxins in 2 copra samples, one naturally contaminated, and 4 samples of naturally contaminated copra meal. The sensitivity and precision of the modified method for aflatoxin B and total aflatoxins were comparable to the official method for peanuts and peanut products. Aflatoxins B_2, G_1 and G_2 were reported by most of the laboratories, but background interferences made quantitative measurement less reliable than for B_1. The method as it presently stands is also applicable to the analysis of coconut. The method has been adopted as official first action; further study will be directed toward improved precision for analysis of aflatoxins B_2, G_1 and G_2. AS

12 J 1516

[Studies on toxic metabolites in foods. I. Screening test for aflatoxin in some Korean fermented soybean foods.]

Lee, T. Y.; Lee, S. K.

Korean Journal of Food Science and Technology 1 (1) 78-84 (1969) [23 ref. Ko, en] [Dept. of Chem., Coll. of Education, Nat. Univ., Seoul, S. Korea]

A study has been made of the possible occurrence of aflatoxins and aflatoxin-like substances in fermented soybean products such as meju and soybean paste. Chloroform extracts from 15 samples which had been defatted with petroleum ether were separated by TLC on silica gel which had been washed with methanol prior to film coating. This improves chromatographic separation and UV absorption spectral identification. In addition to a fluorescing spot having an R_f value the same as aflatoxin B_1, many fluorescing spots occurred in every sample examined. Each fluorescing spot was removed and the ethanol extracts were subjected to further separation by TLC. Each fluorescing substance was eluted with absolute ethanol and the UV absorption spectra were checked. No absorption curve of the eluates corresponded to that of aflatoxin. 2,4-dinitrophenylhydrazine reagent, Tollens' reagent, and ninhydrin reagent were applied to the chromatogram. Data show aflatoxin was not present in any of the soybean products examined. But UV absorption spectra data and the reaction imply that a variety of degradation products or fungal metabolites may be involved in soybean fermentation processes. The toxicity and physiological activity of the many fluorescent substances isolated from the soybean preparations need further investigation. [From En summ.] AS

12 M 1356

[Size of flour particles and its effect on the baking properties of bread.]

Baldzhiev, D.; Syarov, M.; Vangelov, A.

Khranitelna Promishlenost 19 (9) 32-34 (1970) [Bg, en, fr, de, ru]

Flour obtained from 4 mills was divided according to particle size into 4 goups: 1-100 µm 100-200 µm, 200-316 µm, [illegible] the different groups in flours varied widely. With increasing size of flour particles, gl[illegible] decreased. Particle size affected [illegible] the time required to prepare [illegible] physical properties of dough. This [illegible] explained by the differences in the s[illegible] particles and the higher protein content with smaller particles. Best results in baking tests were obtained with the 1-100 and 100-200 µm groups. SH

1 A 50

Photochemical changes of malonaldehyde by the presence of aflatoxins in model systems.
Kwon, T.-W.
Korean Journal of Food Science and Technology 1 (1) 45-50 (1969) [10 ref. En, ko] [Food Resources Lab., Korea Inst. of Sci. & Tech., Seoul, S Korea]

Changes in the UV spectra of malonaldehyde (MA) were observed whilst investigating the interaction of aflatoxins (AT) with food constituents. Equimolar quantities of the AT and MA were mixed to give concn. of 2 × 10-5 M in either (i) 0.05 M phosphate buffer, pH 7 or (ii) in 0.05 M KCl/0.0067 M HCl buffer, pH 2.2. The solutions were exposed to UV radiation (366 mM) from an arc discharge Hg vapour lamp of 1.680 mW cm2. At intervals the UV absorption spectra of the mixture were recorded, the 2-thiobarbituric acid (TBA) test was applied and analytical TLC plates were prepared using 3% v/v methanol/chloroform as developing solvent. A similar reaction was studied in dichloromethane. The recorded UV absorption spectra are presented graphically. The evidence indicated that MA undergoes irreversible photochemical modification in aqueous solution when exposed to UV light of 260 mM, in the presence of AT. UV light of 360 mM induces rapid changes whilst a slower change results from exposure to light from fluorescent room lighting. No changes were observed in solutions kept in the dark. The kinetics of the reaction indicate that parallel dimerization of MA molecules occurs and that AT plays the role of a photosensitizer. **PSM**

1 C 16

Aflatoxin reduction.
Rayner, E. T.; Dwarakanath, C. T.; Mann, G. E.; Dollear, F. G. (United States of America, Department of Agriculture)
United States Patent 3 592 641 (1971) [En]

Contaminated cottonseed and peanut meals are hydrated and brought into contact with O_3 at 75-100°C to achieve substantial lowering of the aflatoxin content. **IFT**

1 H 37

[Studies on kokja of high quality. I. Preparation of a new type of kokja and its properties.]
Chung, H.
Korean Journal of Food Science and Technology 2 (1) 88-92 (1970) [20 ref. Ko. en] [Dept. of Food Tech., Konkuk Univ., Seoul, S. Korea]

An aflatoxin-free, highly active new type of kokja was made with 2 strains of yeast (Y-16, Y-21) and 2 strains of strongly saccharifying Aspergillus (A-32, A-11). Properties of the new kokja were compared with old type kokja, and results were as follows. Saccharifying activity: new kokja B, C and D were excellent (>8.0%), home-made old type kokja was of poor quality. Alcohol fermenation: nw type kokjaC and D >12%, old type K-12 and K-161 <10%. Acid fermentation:old type kokja K-26 and K-156 were better than new type C and D. Fusel oil fermentation: old type kokja K-23, K-26 and K-12 fermented 0.07% and new type kokja C, D and B 0.04%. Adding food preservatives (furylfuramide, diethyl pyrocarbonate) and heat sterilizing of wheat bran for kokja had little effect on the activity of new type kokja. In brewing tests, takju made from kokja C and D had better alcohol and fusel oil concn. than that from old type kokja K-1 and K-23. takju from new type kokja was good enough to drink. [From En summ.] **AS**

1 M 71

[Mycotoxicosis resulting from contamination of wheat, bread and pastry with moulds.]
Stefanovic, M.
Hrana i Ishrana 12 (1 2) 37-40 (1971) [7 ref. Sh, en] [Zavod za zdravstvenu zastitu SRS, Belgrade, Yugoslavia]

This brief review covers common fungal contaminants of cereals and cereal products (e.g. Penicillium, Aspergillus); pathogenic and allergic effects of fungi in man; mycotoxicosis and carcinogenic effects of aflatoxin from mouldy cereals and bread; and control of fungi in cereals and bakery products. **IN**

1 M 76

Survey of aflatoxins in commercial supplies of corn and grain sorghum used for wet milling.
Watson, S. A.; Yahl, K. R.
Cereal Science Today 16 (5) 153-155 & 163 (1971) [9 ref. En] [Moffett Tech. Centre, CPC Int., Argo, Illinois 60501, USA]

Possible aflatoxin contamination of corn and grain sorghum purchased for starch manufacture was studied. The Celite procedure [J. Ass. off. agric. Chem. (1966) 49: 730] was found to be suitable for aflatoxin assay with whole corn and grain sorghum. Analyses were performed on: (i) official grain inspection samples from 230 cars of wet corn purchased in 1965 and (ii) 142 weekly composite samples entering the process in 3 corn wet-milling plants and one grain sorghum wet-milling plant in 1964-65. Only 4 samples of (i) gave positive assays, while (ii) yielded 6 positive samples of corn and 4 positive samples of grain sorghum. There is therefore little evidence of the presence of aflatoxin and so aflatoxin would not be found in wet milled products from this corn. >500 cars of high moisture corn arriving at 3 plants were sampled and visually examined. Repeat assays on 6 of 8 cars that initially gave positive tests for aflatoxin B, validated the initial positive results. These lots had already been placed in low grades which would not be purchased for milling. The need for careful grain handling to minimize mould contamination is stressed. **VJG**

1 M 103

Rice drying and storage studies.

Calderwood, D. L.

Rice Journal 74 (6) 56 (1971) [En] [Transportation and Facilities Res. Div., USDA, Beaumont, Texas, USA]

The effect of rice temp. of 95-120° F on milling yield, germination, drying rate, fuel requirement and electrical consumption was studied. Using a continuous flow heated air dryer (retention time 15 min/pass), average drying rates were 1.0 and 2.75% moisture (dry basis)/dryer pass at 95 and 120° F, respectively. Amount of head rice, % germination and fuel consumption were not affected by different drying temp., electrical consumption was less at higher temp. When alternately heating with microwave energy and cooling by aeration, amount of drying was a function of rice temp., which was dependent on length of exposure to microwave energy. Satisfactory milling yields were obtained when rice temp. at each exposure was increased ≤30° F. 16 heating and cooling periods were required to dry rough rice from 20 to 12% moisture, with 30° F rise in rice temp. each time. After continuous or intermittent aeration (4 h on, 20 h off) and airflow rates of 0.31 and 0.62 ft3/min/cwt, all samples (initial moisture content 16%) were graded number 1 after 280 days of storage. Moisture content dropped 1% in continuously, and ½% in intermittently aerated bins. Average germination % dropped from 86 to 81. Some aflatoxin contamination was found but the concn. was very low. RM

1 M 111

Laboratory wet-milling of corn containing high levels of aflatoxin and a survey of commercial wet-milling products.

Yahl, K. R.; Watson, S. A.; Smith, R. J.; Barabolok, R.

Cereal Chemistry 48 (4) 385-391 (1971) [10 ref. En] [Moffett Tech. Center, CPC International, Argo, Illinois 60501, USA]

Corn was inoculated with spores of Aspergillus flavus and allowed to incubate until mould growth was observed. This corn was found to contain 638 parts/billion (ppb) aflatoxin B_1. This sample and a naturally contaminated sample (120 ppb B_1) were steeped and wet-milled by a laboratory procedure. Aflatoxin was found primrily in steepwater (39-42%) and fibre (30-38%), with the remainder in gluten (14-17%) and germ (6-10%). Increases in concn. of aflatoxin in the fractions compared with the original corn were steepwater, 4-5 fold; fibre, 2.5-3 fold; gluten, 1-1.5 fold; and germ, 1 fold. Starch fractions had aflatoxin levels of 9.0 and 2.2 ppb and hence contained only ~1% of the toxin originally in the corn.

Analyses of 105 samples of commercial corn steepwater produced at 6 individual plants over a period of 1-3 months during new corn movement gave negative aflatoxin results in all cases.

Assays of a number of production samples of starch, germ, gluten, and gluten feed were all negative. Analytical procedures gave sensitivities of 1-3 ppb aflatoxin B_1. AS

2 B 21

Aflatoxins.

Cidoncha, F. S.

Alimentaria 8 (38) 3-6 (1971) [7 ref. Es] [Bioquimico del Inst. de Microbiol. Ind. Madrid, Spain]

A paper presented to the Third National Congress on Microbiology, Fungi Section, held in Barcelona on 3-5 June, 1971. The biochemical aspects of microscopic fungi are outlined. The toxic fungi of the Aspergillus family with their respective mycotoxins are tabulated. The structural formulae for aflatoxins B_1, B_2, G_1 and G_2 and a table of the pathogenic action of B_1 on man and various other animals are given, together with references to sources of infection and levels of toxicity. The fluorescent property of the aflatoxins readily permits their detection by TLC techniques at the very low levels of concn. in foods at which they are effective. BMA

2 C 33

Embryotoxicity of chemical contaminants of foods. [A review]

Clegg, D. J.

Food and Cosmetics Toxicology 9 (2) 195-205 (1971) [59 ref. En] [Food Advisory Bureau, Food and Drug Directorate, Carlingwood Plaza, Carling Avenue, Ottawa, Ontario, Canada]

A brief review is given of some contaminants that may occur in foodstuffs: mycotoxins (aflatoxins), metals (Zn, Cd, Ca, Se, Pb, Hg, ^{90}Sr), nitrosamines, pesticides (2,4,5-T) and polychlorinated biphenyls. It indicates that in the majority of cases embryotoxicity or teratogenicity are toxic hazards unlikely to occur in practice as a result of such contamination. The possible exception is Hg and in particular methylmercury. VJG

2 C 38

Production of aflatoxin in pre-packaged luncheon meat and cheese at refrigerator temperatures.

Oldham, L. S.; Oehme, F. W.; Kelley, D. C.

Journal of Milk and Food Technology 34 (7) 349-351 (1971) [12 ref. En] [Dept. of Infectious Diseases, St. Univ., Manhattan, Kansas 66502, USA]

Samples of Cheddar cheese and luncheon meats were surface inoculated with Aspergillus flavus ATCC 15517. Aflatoxin produced in these samples was determined after 12 days refrigeration at 4.4 or 7.2° C or incubation at 25° C. Aflatoxin was detected in the samples incubated at 25° C but not in the refrigerated samples. MJL

2 C 47

The relationship between the chemical structure of aflatoxins and their effect on bovine pancreas deoxyribonuclease.

Schabort, J. C.; Pitout, M. J.

Enzymologia 41 (4) 201-216 (1971) [27 ref. En. de] [Dept. of Biochem., Rand Afrikaans Univ., Johannesburg, R. of S. Africa]

2 M 206

Survey of corn from different regions for aflatoxin, ochratoxin and zearalenone.
Shotwell, O. L.; Hesseltine, C. W.; Vandegraft, E. E.; Goulden, M. L.
Cereal Science Today 16 (9) 266-270 & 273 (1971) [23 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

The assay of 293 corn samples including all grades of export cargo corn from 10 ports, for aflatoxin, zearalenone and ochratoxin, is reported. 8 contained <6 to 25 parts/billion aflatoxin B_1 and 1 of these contained C_1 as well as B_1. One sample was in SG, 3 were in grade US No. 4, 3 in US No. 3 and 1 in US No. 2. Aspergillus flavus was isolated from 7 of the 8 samples and Asp. parasiticus was isolated from the remaining positive sample. 3 samples contained ochratoxin A (83-166 parts/billion), 2 in grade US No. 4, and 1 in US No. 3. Zearalenone (450-750 parts/billion) was present in 5 samples - 1 in SG, 1 in US No. 4, and 3 in US No. 3. [See also FSTA (1971) 3 7M802.] AS

2 M 207

[Toxigenic fungi growing on stored rice.]
Miyaki, K.; Yamazaki, M.; Horie, Y.; Udagawa, S.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] 11 (5) 373-380 (1970) [11 ref. Ja, en] [Inst. of Food Microbiol., Chiba Univ., 3-9-1, Izumicho, Narashino-shi, Chiba-ken, Japan]

A survey of toxigenic moulds growing on rice stored for private consumption by farmers was made. 2 strains out of 59 of Aspergillus ochraceus were shown to produce ochratoxin A, and 18 strains out of 58 A. versicolor examined were found to produce sterigmatoxin. From the toxic A. clavatus, patulin was detected by TLC but no aflatoxin producing strain was found among the fungi belonging to the A. flavus and A. oryzae groups. The so called "yellow rice moulds" such as Penicillium islandicum and P. citrinum have been detected. TM

2 N 29

[Comparison of the most used methods for aflatoxin determination.]
Prevot, A.; Bloch, C.
Revue Francaise des Corps Gras 18 (3) 151-56 (1971) [8 ref. Fr, en, de, es] [Lab. ITERG, 5 Bvd. de la Tour-Maubourg, Paris 7, France]

A sample of peanut meal was analysed for aflatoxin in 11 laboratories. Comparisons were made of 2 methods for extracting the aflatoxin (4 h with methanol (i), or 30 min with chloroform (ii)) and of 2 methods for measuring the fluorescence (extinction of fluorescence (iii). or comparison with a standard solution (iv)). Statistical analysis of the results showed high coeff. of variation (CV) ranging from 41 - 58%. The method using (ii) and (iv) gave the smallest CV. 9 laboratories tested pure solutions of aflatoxins B_1 and C_1, using method (iv). The results were less variable than with the peanut meal (CV,37 - 66%) but of the same order as those reported in the literature. The most common methods used for extracting aflatoxins are summarised in tabular form. MEG

2 U 72

Safety standards for aflatoxins in Rhodesia.
Toit, A. A. du
Rhodesia Agricultural Journal 68 (4) 67-69 (1971) [6 ref. En]

The max. permissible level of aflatoxin B_1 in groundnuts and groundnut products for human consumption has been set by the Rhodesian Aflatoxin Standards Committee at 0.025 ppm. The permissible level of aflatoxin B_1 in feeds for dairy cows, as fed, is 0.05 ppm. NdeV

3 C 65

[Toxin-forming moulds in foods of plant origin.]
Toxinbildende Schimmelpilze in Lebensmitteln pflanzlicher Herkunft.
Müller, G.
Lebensmittel-Industrie 18 (8) 289-294 (1971) [9 ref. De, en, ru] [Sektion Nahrungsgüterwirtschaft und Lebensmitteltech., Humboldt-Univ., Berlin, Germany]

3 C 66

[Aflatoxin production in raw sausages and in rice in relation to time and temperature.]
Aflatoxinbildung in Rohwurst und Reis in Abhängigkeit von Zeit und Temperatur. [A letter]
Tauchmann, F.; Leistner, L.
Fleischwirtschaft 51 (1) 77-79 (1971) [20 ref. De, en]

Raw sausages and rice were inoculated with (i) Aspergillus parasiticus CMI 15957 or (ii) Asp. flavus 3145. Amounts of aflatoxins found (parts/billion) were: in sausages inoculated with (i), 342 after 21 days at 15°C and 912 000 after 30 days at 25°C; in sausages inoculated with (ii), 17 after 27 days at 15°C and 17 070 after 30 days at 25°C; in rice inoculated with (i), 30 200 after 21 days at 25°C; and in rice inoculated with (ii), 157 870 after 15 days at 25°C. Aflatoxin G_1 predominated in sausages, with small quantities of B_1 and G_2 present and practically no B_2. In rice, amounts of G_1 and B_1 exceeded those of B_2 and G_2. FWJ

3 C 68

Radiation resistance of aflatoxins.
Frank, H. K.; Grunewald, T.
Food Irradiation (Saclay) 11 (1/2) 15-20 (1970) [20 ref. En] [Fed. Res. Centre for Food Preservation, Karlsruhe, W. Germany]

A series of studies of aflatoxin irradiation indicated that in the dry state aflatoxins are extremely resistant to radiation which suggests that destruction of them in dehydrated foods might only be possible at doses which would produce

undesirable effects in the food. Results for aflatoxins in solutions (water, phosphate buffer, chloroform) were more encouraging. Aflatoxins were more stable in chloroform than in aqueous solutions. A dried slurry of aflatoxin-containing bread was irradiated with doses of 0.1-5 Mrad. 0.1 Mrad produced no measurable reduction in aflatoxin content. In the range 0.25-5 Mrad the amount of aflatoxin remaining varied between 50 and 100% of the initial amount. These results agree with those obtained for pure dry aflatoxin. Irradiation of aflatoxin-contaminated rice kernels (moisture contents, 8, 16, 32%) with up to 3 Mrad, followed by storage for up to 12 months did not lead to a noticeable reduction in aflatoxin content. Similar results were obtained when NaCl was added to the rice. Conclusions are that it would be virtually impossible to destroy aflatoxins in foodstuffs by irradiation without harming the food. AHV

3 C 75

[Simple, rapid method for quantitative determination of flavocoumarins (aflatoxins).]

Jacquet, J.; Boutibonnes, P.; Teherani, A.

Industries Alimentaires et Agricoles 88 (1) 5-14; (5) 689-697 (1971) [61 ref. Fr, de, en]

Methods for identifying and quantitatively estimating flavocoumarins are reviewed. A rapid method is described in which the flavocoumarins are variously extracted and separated by ascending TLC on microscope slides coated with silica gel G using 5 different solvent systems. Flavocoumarins B, G and M separate as discrete spots which fluoresce under UV light. Identification of the spots is by R values and chemical tests on the slides, together with quantitative bioassays using Daphnia pullex or Bacillus stearothermophilus. Flow sheets for the extraction and identification of flavocoumarins in high-fat materials (cheese, milk) and other materials (wines, coffee, mildewed carrots and wheat, oats) are given. **AH**

3 J 464

The microorganisms in nuts and dried fruits.

Wehner, F. C.; Rabie, C. J.

Phytophlactica 2 (3) 165-169 (1970) [11 ref. En, af, fr] [Res. Inst. for Plant Protection, Private Bag 134, Pretoria, R. of S. Africa]

By employing the agar plate method, the number and types of microorganisms on a variety of samples of processed and non-processed nuts and dried fruits was determined. Bacteria, fungi, yeasts and streptomycetes were found on these products, with counts varying from nil to 17 million per g. High microbial counts (>10 000/g) occurred only sporadically. Nuts contained the highest number of microorganisms, viticultural highest and tree fruits the lowest. Counts on non-processed samples were much higher than those on processed samples. Of the 13 taxa of bacteria, 28 taxa of fungi, 2 yeasts and streptomycetes that were encountered, Bacillus and Aspergillus niger V. Teighem spp. occurred most often. Aspergillus flavus Link, A. niger, Monilia, Mucor, Penicillium frequentans Westling, P. notatum Westling, Rhizopus, Spicaria, Trichoderma and an unidentified Penicillium sp. were tested for the production of toxins by incorporating maize, containing these fungi, into a chicken ration and feeding it to New Hampshire chickens. Rations containing A. flavus, A. niger and Spicaria caused detrimental effects. **AS**

3 S 228

[Aflatoxins in meat and meat products: occurrence of aflatoxin-forming strains of Aspergillus flavus.] Aflatoxine bei Fleischprodukten und Untersuchungen über die Häufigkeit der Aflatoxinbildung durch Aspergillus flavus-Stämme.

Hadlok, R.

Fleischwirtschaft 50 (11) 1499-1502 (1970) [35 ref. De, en, fr] [Frankfurterstrasse 94, 6300 Giessen, W. Germany]

Following a literature review on aflatoxin production by Asp. flavus in meat and meat products some further experiments are reported. 2 strains of Asp. flavus were isolated from dry sausages, 1 from a frankfurter-type sausage and 153 strains from 6 samples of black pepper. The strains isolated from the sausages did not produce aflatoxin under experimental conditions; 30% of the strains isolated from black pepper did produce aflatoxin. **FWJ**

4 C 85

[Improvements in the hygiene analysis of foods for the detection of aflatoxin. UV-absorption spectrometry.] Verbesserung der hygienischen Untersuchung von Lebensmitteln zum Nachweis von Aflatoxinen. Die UV-Absorptionsspekrometrie.

Bösenberg, H.; Neugebauer, W.

1468dd **155** (1) 70-77 (1971) [8 ref. De, en] [Hygiene-Inst., Univ., Münster, W. Germany]

Aflatoxins are separated by TLC. The remission of silica gel layers of ~0.2-0.3 mm thickness, without addition of a fluorescence indicator or a binding agent, is measured by a special Zeiss remission spectral photometer. This method is claimed to be 10× more accurate than the usual transmission method for determination of B_1 aflatoxins, which can be quantitatively evaluated at concn. between 0.5 and 7.5 µg. **JK**

4 C 90

Control and removal of aflatoxin. [A review]
Goldblatt, L. A.
***Journal of the American Oil Chemists' Society* 48** (10) 605-610 (1971) [46 ref. En] [S. Regional Res. Lab., New Orleans, Louisiana 70119, USA]

Methods for prevention of the development of aflatoxin and for the removal or destruction of aflatoxin from contaminated materials when efforts at prevention fail are reviewed. JA

4 C 91

Aflatoxin effects in livestock.
Keyl, A. C.; Booth, A. N.
***Journal of the American Oil Chemists' Society* 48** (10) 599-604 (1971) [16 ref. En] [W. Regional Res. Lab., Albany, California 94710, USA]

Feeding trials were conducted with swine, cattle, and poultry to determine adverse effects of graded levels of aflatoxins in rations. Samples of meat, eggs and milk from these animals were analysed to determine if aflatoxin was transmitted into these products. In growing-fattening swine, no toxic effects were observed when aflatoxin level fed was 233 parts/billion (ppb) or less. In a swine reproduction experiment, no adverse effects were detected in pigs produced from sows fed 450 ppb aflatoxin. No toxic effects were observed at levels of 300 ppb or lower in cross-bred beef steers fed aflatoxin rations for 4.5 months. No aflatoxin was detected in meat from swine and cattle fed rations containing 800 and 1000 ppb of aflatoxin, repsectively. In dairy cows, weekly intakes of 67-200 mg of aflatoxin B_1/cow produced 70-154 ppb aflatoxin M_1 in lyophilized milk. Rapid disappearance of aflatoxin M_1 in milk took place after withdrawal of aflatoxin from the ration. No adverse effects were discernible in broilers fed from 1 day to 8 wk of age a ration containing 400 ppb aflatoxin. Lyophilized meat from broilers fed 1600 ppb aflatoxin for 8 wk contained no detectable aflatoxin. Striking differences in aflatoxin susceptibility were observed in 17 different breeds and strains of poultry and game birds fed from 2 to 6 wk of age a ration containing 800 ppb aflatoxin B_1. Eggs and meat from White Leghorn hens fed a ration containing 2700 ppb aflatoxin contained no detectable aflatoxin. AS

4 C 93

Improvement of the AOAC kilogram sample method for the isolation of aflatoxin B_1 for chemical and biological confirmation.
Stack, M.; Rodricks, J. V.
***Journal of the Association of Official Analytical Chemists* 54** (6) 1310-1312 (1971) [3 ref. En] [Div. of Chem. and Physics, FDA, Washington, DC 20204, USA]

The official AOAC 1 kg method of isolating aflatoxin B_1 for confirmative testing has been improved. An acid alumina column substituted for the 10 g silica gel column eliminates the oily residue which interferes with preparative TLC. Time is saved by processing only enough extract to yield the required amount of aflatoxin. Application of the procedure to aflatoxin-contaminated peanut butter, Brazil nuts, cottonseed meal, and corn resulted in aflatoxin B_1 extracts which showed only one spot on TLC plates and gave positive derivative and Bacillus megaterium tests. Aflatoxin-free sample extracts gave negative B. megaterium tests. AS

4 C 94

Chromatography of crude aflatoxins on Adsorbosil-5.
Chu, F. S.
***Journal of the Association of Official Analytical Chemists* 54** (6) 1304-1306 (1971) [13 ref. En] [Food Res. Inst., Univ., Madison, Wisconsin 53706, USA]

A method is described involving the use of Adsorbosil-5 silica gel as a stationary phase for aflatoxin purification. This method is especially advantageous for obtaining large quantities of aflatoxins B_1 and G_1 in a single chromatographic step. The distribution of individual aflatoxins in the different fractions obtained from chromatography on an Adsorbosil column is illustrated. AS

4 J 547

Controlled atmosphere for short-duration storage of peanuts before drying.
Moseley, Y. C.; Manbeck, H. B.; Barnes, G. L.; Nelson, G. L.
***Transactions. American Society of Agricultural Engineers* 14** (2) 206-210 (1971) [4 ref. En] [Agric. Eng. Dept., St. Univ., Stillwater, Oklahoma, USA]

The effects of environmental storage factors (temp., storage gas, field curing, time) on quality maintenance of Spanish peanuts were evaluated by determining mould proliferation, aflatoxin production, taste and commercial grade. Freshly dug peanuts were stored at 40 or 70-75°F. in air, N_2 or CO_2, without treatment or after 4 days field curing to 20% moisture, and after 2, 4, 8, 16 or 32 days. All samples were inoculated with Aspergillus flavus. Results are shown in tables. Data at 4 and 8 day level were analysed statistically. Peanuts exposed to ambient temp deteriorated much more rapidly than cooled samples. Aflatoxin developed in kernels of peanuts stored in air at warm temp. when A. flavus was present on undried pods, was reduced by partial field curing, by N_2 or CO_2, and absent from refrigerated samples. Analysis of variance

indicated that cool temp. and/or partial field curing significantly increased grade quality percentage of peanuts, while no significant difference was noted between 4 day and 8 day storage peanuts. From visual tests, CO_2-cold-stored samples had less mould and did not develop fermentation odour, but did not perform as well as control samples in organoleptic tests (on stored peanut butter and roasted peanuts), indicating some adverse effect of the gas or the additional storage time at high moisture content. **RM**

4 J 634

Influence of fungicides and irrigation practice on aflatoxin in peanuts before digging.

Pettit, R. E.; Taber, R. A.; Schroeder, H. W.; Harrison, A. L.

Applied Microbiology **22** (4) 629-634 (1971) [20 ref. En] [Dept. of Plant Sci., Agric. Expt. Sta., College Station, Texas 77843, USA]

Peanuts grown under dryland conditions where drought stress occurred accumulated more aflatoxin before digging than peanuts grown under irrigation. Kernels became more susceptible to Aspergillus flavus and A. parasiticus invasion when the soil moisture in the pod zone approached levels at which moisture moved from the pod into the soil and the kernel moisture dropped below 31%. Isolation frequencies of these aspergilli from fresh-dug kernels were lowest in 1968 (max. of 3%). In 1967 and 1969, max % of 100 and 74, repsectively, were noted. Kernel infestation was correlated with degree of aflatoxin contamination. Dryland fresh-dug kernels contained a max. of 35.8 ppm aflatoxin while a max. of 0.05 ppm was detected in kernels from irrigated plots. In 1969, A. flavus infestation was as high as 59% in peanuts from irrigated plots; however, no aflatoxin was detected. Absence of aflatoxin in these samples is attributed to the higher kernel moisture content which reduced the aflatoxin-producing potential of A. flavus. Statistical analysis of the data revealed no significant differences in degree of fungal infestation, production levels, and grade factors between any fungicide treatments. AS

4 P 480

[Formation of aflatoxins in milk and milk products. IV. Model experiments with milk powder.] Zur Aflatoxinbildung in Milch und Milchprodukten. IV. Modellversuche mit Milchpulver.

Kiermeier, F.

Zeitschrift für Lebensmitteluntersuchung und -Forschung **146** (5) 262-265 (1971) [5 ref. De, en] [Milchwissenschaftliches Inst., Tech. Univ., Munich, W. Germany]

Experiments were conducted to investigate the influence of moisture content, relative humidity, and storage time on the formation of aflatoxins B_1 and G_1 in dried skim-milk following inoculation of the powder with Aspergillus parasiticus, Asp. flavus and Penicillium puberulum. Asp. parasiticus was the most active source, and a relative humidity of 80% was a limiting min. for the production of aflatoxins. Ranges of 0.06-19.2 mg/100 g of dry powder were produced by the 3 moulds. The level of aflatoxins detected at any particular time during storage for 4-37 days at 20°C varied considerably. Some difficulty in the exact measurement of aflatoxins B_1 and G_1 was experienced owing to their rapid breakdown by chemical or enzymatic means, and to the production of conversion products B_2 and G_2 which were not detected by the method used. [See also FSTA (1971) **3** 7P1134 for part III.] [See also following abstr.] **BM**

4 P 481

[Aflatoxin formation in milk and milk products. V. Application of the chick embryo test for confirmation of thin layer chromatographic determination of aflatoxin in cheese.] Zur Aflatoxinbildung in Milch und Milchprodukten. V. Anwendung des Hühnerembryo-Testes zur Sicherung des dünnschichtchromatographischen Aflatoxin-Nachweises in Käsen.

Kiermeier, F.; Böhm, S.

Zeitschrift für Lebensmitteluntersuchung und -Forschung **147** (2) 61-64 (1971) [4 ref. De, en] [Chem. und Physiol. Inst. Süddeutsche Versuchs- und Forschungsanstalt für Milchwirtschaft, Tech. Univ. München, Weihenstephan, W. Germany]

Suspected presence of low levels of aflatoxin in cheese samples, as indicated by TLC, could be confirmed by a modified chick embryo test. Fresh eggs were inoculated with 0.05 ml of the test cheese extract in 70% ethanol or chloroform solvent into the air sac, and the hole was sealed with adhesive tape. After 1 h at room temp., eggs were placed at 37.8°C and 50-60% RH and turned twice daily. On days 4, 6 and 14, eggs were examined with a mercury vapour lamp and non-sterile eggs removed. On day 17 the temp. was reduced to 37.6°C and the RH raised to 60-80%, and on day 21 the remaining non-sterile eggs were counted. 12 of 34 cheeses suspected of containing aflatoxin (~ 1 µg/100 g) were tested by this method, and aflatoxin was confirmed in 7 ($P<0.05$ - $P<0.001$). The LD_{50} for chick embryo was 0.01 µg aflatoxin B_1 or 0.2 µg aflatoxin G_1. [For part IV see preceding abstr.] CDA

4 S 512

[Examination of locally-produced salami for the presence of aflatoxins.]

Splendiani, F.; Lucisano, A.

Zooprofilassi **26** (9/10) 343-347 (1971) [It] [Cattedra di Ispezione degli Alimenti di origine animale, Univ., Naples, Italy]

No aflatoxins were detected on the casings or in the fillings of 50 mouldy samples of pork and mixed meat salami; nor were aflatoxins produced by any of the fungal isolates grown on Czapek agar and then incubated for 20 days at 30°C, either

alone or in contact with a slice of salami. An unidentified fluorescent substance, initially suggesting the presence of aflatoxin G_2, isolated from the casings of 5 samples, was shown to be produced by Aspergillus sclerotiorum. It is concluded that production of aflatoxins in Italian salami will only occur under exceptional circumstances. ECA

5 S 628

Aflatoxicosis and bruising in the chicken.

Tung, H.-T.; Smith, J. W.; Hamilton, P. B.

Poultry Science **50** (3) 795-800 (1971) [15 ref. En] [Dept. of Poultry Sci., St. Univ., Raleigh, N. Carolina 27607, USA]

The possibility that aflatoxicosis is a predisposing factor in bruising was investigated by determining the minimal energy required to produce a bruise on the breast muscle of chickens receiving graded doses of dietary aflatoxin. Doses of aflatoxin as small as 0.625 μg g are insufficient to affect the growth rate of commercial broiler chickens, yet this concn. lowered by 18% the energy required to produce a bruise. Higher doses caused up to a 50% reduction. In similar experiments, the capillary fragility of the anterior wing web was increased and the lateral shear strength of the breast muscle was decreased by doses of aflatoxin too small to affect growth rate. A time course study showed that chickens placed on a diet containing 5.0 μg aflatoxin g developed a significant increase in capillary fragility within 48 h. These findings suggest that dietary aflatoxin produces a generalized loss of strength and integrity in tissues of the chicken and that this loss results in increased susceptibility to bruising. AS

6 B 61

Aflatoxin M_1 removal from aqueous solutions by Flavobacterium aurantiacum.

Lillehoj, E. B.; Stubblefield, R. D.; Shannon, G. M.; Shotwell, O. L.

Mycopathologia et Mycologia Applicata **45** (3/4) 259-266 (1971) [26 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois, USA]

As part of this study, it was demonstrated that aflatoxin M_1 could be removed from milk by Flavobacterium aurantiacum cells. However, it is pointed out that the number of cells required for the procedure might limit the practical application of this type of detoxification. EJM

6 C 135

[Aflatoxins: research and detection.] [A lecture]

Brouwer, T.

Voeding **32** (12) 631-641 (1971) [1 ref. Nl] [Keuringienst van Waren, The Hague, The Netherlands]

An historical survey is given of research work on detection of aflatoxins, their chemical structure and occurrence in food products. MDB

6 M 597

[Mycotoxins - a problem in cereal chemistry and technology.] [A review]

Valtadoros, A.

Hemika Hronika **36** (10) 232-239 (1971) [93 ref. Gr, fr] [Cereal Inst., Thessaloniki, Greece]

Structure, properties and determination of aflatoxins B_1, B_2, G_1 and G_2 are reviewed. Methods of crop storage to prevent mycotoxin formation in Mediterranean countries and of detoxification proposed for tropical countries are indicated. RM

6 M 598

Broken kernels harbour aflatoxin.

Anon.

Agricultural Research (Washington) **20** (6) 15 (1971) [En]

Separating broken kernels and foreign material from whole kernels is suggested as an effective method of aflatoxin control in stored corn. Aflatoxin concn. was reduced to a trace in 20 of 21 contaminated samples after separation of broken kernels by sieving. RM

6 M 607

Screening method for aflatoxin in corn and various corn products.

Dantzman, J.; Stoloff, L.

Journal of the Association of Official Analytical Chemists **55** (1) 139-141 (1972) [11 ref. En] [Div. of Food Tech., FDA, Washington, DC 20204, USA]

An abbreviated AOAC method has been developed for detecting aflatoxin in corn. The residual oil from a water-chloroform extraction of the sample is used for spotting the thin layer chromatogram. The silica gel cleanup column is omitted, thereby realizing a substantial saving in time and materials. Sensitivity of the method is <5 μg aflatoxin B_1/kg corn sample. The method is applicable to shelled corn, corn meal, canned sweet corn, and corn breakfast cereal. AS

6 T 327

[Food additives.]

Logten, M. J. van

Officieel Orgaan van de Koninklijke Nederlandse Zuivelbond 64 (4) 91-94 ; (5) 120-122 (1972) [Nl]

In this survey-type article, semi-chronic and chronic toxicity tests of foods, using laboratory animals, are discussed. Aspects of specific food toxicants examined include WHO parctical residue levels for DDT in milk and milk products, relationship between DDT content of milk and frequency of application of DDT-containing preparations in cowsheds etc., carcinogenicity of aflatoxin B_1, aflatoxin M in milk, trends in antibiotics residue contents of liquid milk in the Utrecht (The Netherlands) food inspection region, and methylmercury in fish, including Hg content in various freshwater species in The Netherlands in 1970. NdeV

7 A 323

Aflatoxin detection by thin-layer chromatography-mass spectrometry.

Haddon, W. F.; Wiley, M.; Waiss, A. C., Jr.

Analytical Chemistry 43 (2) 268-270 (1971) [6 ref. En] [W. Regional Res. Lab., USDA, Albany, California 94710, USA]

7 C 166

Detection of aflatoxin using small columns of florisil.

Velasco, J.

Journal of the American Oil Chemists' Society 49 (2) 141-142 (1972) [2 ref. En] [USDA, Market Quality Res. Div., Beltsville, Maryland 20705, USA]

This simplified procedure to detect aflatoxin in cottonseed and cottonseed products can be used at the field level where equipment for TLC is not available. Contamination levels as low as 10 parts/billion can be detected in these columns or tubes using longwave UV light. Development and detection of aflatoxin in these tubes takes ~10 min. AS

7 C 167

A note on the estimation of aflatoxins by thin-layer chromatography.

Altenkirk, B.

Journal of Chromatography 65 (2) 456-457 (1972) [6 ref. En] [Nat. Inst. for Nutr. Diseases, Private Bag 380, Pretoria, South Africa]

In this assay method for aflatoxins, an alternative to column chromatographic clean-up procedures, to remove interfering oils and pigments, is provided by spotting the primary extract of a foodstuff onto warm TLC plates (6 × 14 cm) coated with Camag D-5 silica gel. After developing along the short axis with dry ether, the plate is developed along the long axis using the system chloroform/trichloroethylene/t-butanol/formic acid, 85:10:4:1 (by vol.). For complete clearance of interfering compounds the plate can again be developed in ether along its short axis. Aflatoxin content is determined by densitometric comparison with a standard run on the same plate. Lower limits of detection in maize flour, peanut butter and dried milk, respectively, were found to be 3-4, 4-6 and 5-9 µg/kg sample. SAC

7 C 168

Kinetic study of acid-catalysed conversion of aflatoxins B_1 and G_1 to B_{2a} and G_{2a}.

Pons, W. A., Jr.; Cucullu, A. F.; Lee, L. S.; Janssen, H. J.; Goldblatt, L. A.

Journal of the American Oil Chemists' Society 49 (2) 124-128 (1972) [18 ref. En] [S. Regional Res. Lab., New Orleans, Louisiana 70119, USA]

Adjusting dil. aqueous solutions of aflatoxins B_1 and G_1 to pH 1, 2 and 3, and heating over a range of 40-100°C resulted in the conversion of B_1 to B_{2a} and G_1 to G_{2a} as major products. Both B_{2a} and G_{2a} were identified by co-TLC with authentic B_{2a} and G_{2a} and M_1 on silica gel plates developed in 2 different solvents. The rate of disappearance of B_1 or G_1 at given temp. and at constant pH was found to be first order with respect to each aflatoxin. At given temp. the conversion is strangly pH dependent, a 10-fold increase in H^+ ion (1 pH unit) producing about a 9-fold increase in the reaction rate, indicating first order dependence of the rate on H^+ ion concn. AS

7 C 174

Toxic chemicals in foods.

Falk, H. L.

Abstracts of Papers. American Chemical Society **163**: AGFD18 (1972) [En] [Nat. Inst. of Environmental Health Sci., PO Box 12233, Res. Triangle Park, N. Carolina 27709, USA]

Toxic chemicals covered in this review include: toxic compounds occurring naturally in foods, mycotoxins, bacterial toxins, pesticides and other trace contaminants, and food additives. The risk of cancer from high-caloric diets and the possibility of synergism between different types of toxic food components are discussed. JA

7 C 180

Dietary aflatoxins and human liver cancer. I. Toxigenic moulds in foods and foodstuffs of tropical South-East Asia.

Shank, R. C.; Wogan, G. N.; Gibson, J. B

Food and Cosmetics Toxicology 10 (1) 51-60 (1972) [16 ref. En, fr, de] [Dept. of Nutr. and Food Sci., Massachuse [illegible] Tech., Cambridge.

02139, USA]

Mycological studies were carried out on 3057 samples representing more than 170 different types of food, collected from towns and villages of Thailand and from Hong Kong, between Sept. 1967 and July 1969, in an attempt to evaluate the relationship between dietary loads of aflatoxin and incidence of liver cancer. Number of samples examined, number contaminated and individual moulds identified are tabulated for rice, peanuts, mung beans, corn, sesame seeds, cassava starch, dried fish/shrimp, fresh vegetables, spices, prepared foods etc. Aspergillus was found to be the commonest contaminating fungus with Asp. flavus the predominating species, but Rhizopus, Penicillium and Fusarium were also present. Seasonal variation in mould contamination in Thailand was also studied. Bioassays evaluating acute and subacute toxicity to rats identified the infecting agents capable of producing mycotoxins other than aflatoxins. Among 162 isolates, 49 proved to be toxigenic and these included species of all the genera commonly identified in food samples. VJG

7 C 181

Dietary aflatoxins and human liver cancer. II. Aflatoxins in market foods and foodstuffs of Thailand and Hong Kong.

Shank, R. C.; Wogan, G. N.; Gibson, J. B.; Nondasuta, A.

Food and Cosmetics Toxicology **10** (1) 61-69 (1972) [8 ref. En, fr, de]

Of the 2000 samples of market foods and foodstuffs collected in Thailand, peanut products were the most frequently and most highly contaminated with aflatoxins. Number of samples examined, number contaminated (%), mean aflatoxin B_1 concn. (µg/kg sample), and mean total aflatoxin concn. were respectively: peanuts, 216, 49, 426, 750; corn, 62, 35, 93, 140; millet, wheat and barley, 44, 11, 4, 7; dried chilli peppers, 106, 11, 9, 14. For the other foods studied (see preceding abstr.) ranges were: 65-364, 0-6, <1-16, <1-31. Rice was seldom contaminated: 364, 2, <1, <1 respectively. The frequency and extent of contamination showed geographical distributions and followed seasonal trends. Beans were the chief source of aflatoxin in the Hong Kong foodstuffs examined. Number of samples examined and number contaminated were respectively: mung beans, 12, 8; other beans, 68, 13. The results of this study provided the basis upon which Thai populations were selected to measure directly the amounts of aflatoxin ingested in food. VJG

7 C 182

Dietary aflatoxins and human liver cancer. III. Field survey of rural Thai families for ingested aflatoxins.

Shank, R. C.; Gordon, J. E.; Wogan, G. N.

Food and Cosmetics Toxicology **10** (1) 71-84 (1972) [9 ref. En, fr, de]

7 C 184

Aflatoxin residues in food and feed derived from plant and animal sources. [A review]

Armbrecht, B. H.

Residue Reviews **41**: 13-54 (1972) [Numerous ref. En, fr, de] [Div. of Vet. Res., FDA, US Dept of Health, Education & Welfare, Agric. Res. Center, Beltsville, Maryland 20705, USA]

The subject is reviewed with reference to agricultural products of plant origin, aflatoxicosis and tissue residues in products of animal origin, residues in processed foods, and analytical methods. OA

7 J 1267

Aflatoxin in haricot bean and other pulses.

Habish, H. A.

Experimental Agriculture **8** (2) 135-137 (1972) [6 ref. En] [Fac. of Agric., Univ. of Khartoum, Sudan]

50 samples (1-2 kg) of 10 different pulses (haricot beans, tick beans, chickpeas, cowpeas, dolichos beans, fenugreek, lentils, lupins, peas and pigeon peas) were collected from shops and stores in Khartoum and Northern Province, Sudan. 24 samples of mature, semi-dry pods of haricot beans were collected from fields of the Fac. of Agric., Khartoum North, and the Hudeiba Agric. Res. Sta., Northern Province; clean pods were harvested separately from those with mouldy tips. Moisture content of the pulses was determined by oven drying, and aflatoxins were determined by TLC. Fungi were determined in 50 seeds of each sample, by incubation of batches of 5 seeds in a petri dish lined with moist filter paper. Tables of results are given. All 20 samples of stored haricot beans, and most samples of tick beans, chickpeas, cowpeas, dolichos beans and fenugreek contained aflatoxin; fresh haricot beans contained little or none. All samples were contaminated with Aspergillus flavus, the incidence of which was correlated with aflatoxin levels in haricot beans. All samples also contained A. niger, but the incidence of Penicillium spp. was low; the greatest degree of contamination with other fungi (mainly Helminthosporium and Alternaria spp) was found in fresh haricot beans, especially those from mouldy pods. Drying haricot bean pods immediately after harvest is suggested as a method of controlling mould growth and aflatoxin formation. AJDW

7 M 709

[Occurrence and importance of foreign substances in cereals.] Vorkommen und Bedeutung von Fremdstoffen bei der Getreidenahrung. [A review]

Engst, R

Ernährungsforschung **15** (2) 275-285 (1971) [29 ref. De]

The occurrence in cereals of pesticides and fumigants (e.g. DDT, lindane, pyrethrum + piperonyl butoxide, methoxychlor, malathion, parathion, dichlorvos, PH_3, HCN, ethylene oxide,

methyl bromide), plant growth regulators (e.g. chlorocholine chloride), nitrosamines, 3,4-benzopyrene, Pb, mycotoxins (particularly aflatoxin) is reviewed with reference to the source of such contaminants, residue levels in cereals, toxicity to humans, and tolerance levels in cereals. AFa

7 M 722

Some effects of cooling rates on quality of high moisture corn.

Hodges, T. O.; Converse, H. H.; Sauer, D. B.

Transactions. American Society of Agricultural Engineers **14** (4) 649-655 (1971) [3 ref. En] [Agric. Eng. Dept., Kansas St. Univ., Manhattan, USA]

Effects of different cooling rates by low temp. aeration on quality of high-moisture field-shelled corn were investigated during 2 seasons. Corn (initial moisture content 20-28%, temp. 70-90°F, stored in 140 bushel bins) was cooled to storage temp. of 35-40°F in 2, 4 and 8 days using an upward air flow of 0.5 ft^3/min/bushel. Samples were tested for moisture content, % germination acidity value and the presence of various fungi. Results are shown graphically. Fast cooled corn had a low mould population, slow cooled corn a high population, with medium cooled intermediate. Greatest amounts of mould growth occurred in the upper part of bins. Corn in slow cooled bins and upper parts had high fat acidity values (24-41 mg KOH/100 g grain, dry basis). Germination % was less sensitive but showed the same trend. Extensive growth of Pencillium after 3 months' storage indicated that 35-40°F is not cold enough for prolonged storage of high-moisture corn. Mould growth was encouraged by mechanical damage, but was much lower in 20% than in 25-28% moisture corn. Slow cooled corn with 25% moisture developed a high population of Aspergillus flavus, accumulating 16-95 parts/billion aflatoxin B_1 within a few days of harvest. RM

7 M 751

Aspergillus flavus deterioration of grain: its effect on amino acids and vitamins in whole wheat.

Kao, C.; Robinson, R. J.

Journal of Food Science **37** (2) 261-263 (1972) [11 ref. En] [Dept. of Grain Sci. & Ind., Kansas St. Univ., Manhattan, 66502, USA]

Hard Red Spring (i) and Hard Red Winter (ii) wheats at 20% moisture content were inoculated with Aspergillus flavus spores and incubated at 30°C for 7 months to give heavily moulded wheats to analyse for amino acids, vitamins and aflatoxin. Mouldy corn was also analysed for aflatoxin. Changes in nutrients and distribution of aflatoxin in the Asp. flavus-deteriorated grain kernels were dramatic. The amino acid compositions of (i) and (ii) were quite similar before the wheats moulded. Afterwards (i) arginine and cysteine had decreased 54.0% and 74.5% respectively, while methionine had increased 54.0%. In moulded (ii), lysine, histidine and arginine had decreased 45%, 49.5% and 50% respectively, and methionine had increased 34.5%. Vitamin increases in moulded (i) were riboflavin, 295%; vitamin B_6, 46%; vitamin B_{12}, 276%; niacin, 79%; and pantothenic acid, 463%. Thiamine decreased 43%. Vitamin increases in moulded (ii) were riboflavin, 179%; vitamin B_6, 18%; vitamin B_{12}, 37%; and pantothenic acid, 12.3%. Thiamine decreased 48.7% and niacin 25.3%. There was no detectable aflatoxin in (ii) and in (i) most aflatoxins remained in the bran when the wheat was milled; high and low ash flour had only traces of aflatoxins. The % of distribution of aflatoxin B_1 in milled products of corn were: feed, 12.8; germ, 27.6; grits, 5; and meal, 54.6. AB

7 P 1059

Partitioning behaviour of aflatoxin M in dairy products.

Grant, D. W.; Carlson, F. W.

Bulletin of Environmental Contamination and Toxicology **6** (6) 521-524 (1971) [7 ref. En] [Dept. of Microbiol., St. Univ., Fort Collins, Colorado 80521, USA]

Known amounts of aqueous aflatoxin M were added to samples of whole milk, skim-milk and cream and its distribution in the cream, butter and curd fractions determined. Extraction of aflatoxin M from these fractions and chromatographic analyses were performed using the methods of Roberts & Allcroft [Fd Cosmet. Toxicol. (1968) **6** (3) 339-340]. Results show that during normal creaming of contaminated milk the cream fraction would contain only ~10% of the toxin originally present in whole milk. Of aflatoxin originally present in pasteurized cream ~10% was contained in butterfat; 60% was recovered from buttermilk and 30% from the washings. Curd fraction of Cottage cheese produced from contaminated skim-milk samples contained 50% of the added aflatoxin M; whey contained 40% and washings 10%. PG

8 A 333

[Food chemists in Kiel.] Lebensmittelchemiker in Kiel.

Anon. (Diemair, W.; Pfleider, G.; Nyvold, E.; Thier, H.; Mollenhauer, H. P.; Antoniacopoulos, N.; Meyer, V.; Lind, J.; Weder, J.; Belitz, H.-D.; Hanssen, E.; Eskebjerg, K.; Bergstrom-Nielsen, M.; Jellinek, G.; Man, J. C. de; Fluge, M.; Balazs, O.

Thode, E.)
Alimenta 7 (6) 154-157 (1968) [De & En]

Resumes are given of papers given at a food chemists conference in Kiel in Sept. 1968. They include: New data on the behaviour of sulphurous acid in the organism, by W. Diemair & G. Pfleider [De]; The atomic absorption method for the analysis of trace metals as used by a can-making firm, by E. Nyvold [En]; Fluorometric determination of some antioxidants, by H. Thier [De]; Significance of amounts consumed in connection with the evaluation of food additives, by H. P. Mollenhauer [De]; Method of quality evaluation of fish and fish products, by N. Antonacopoulos [De]; Role of bacteriological tests in quality control of fish, by V. Meyer [De]; Determination of acid phosphatase activity in canned meat, by J. Lind [En]; Trypsin and chymotrypsin inhibitors in Leguminosae, by J. Weder & H.-D. Belitz [De]; Incidence of aflatoxin B_1 and changes occurring during the preparation of some foods, by E. Hanssen [De]; Use of statistical methods for long-term quality-control in the brewing industry, by K. Eskebjerg [De]; Determination of residues: the systematic testing of analytical methods, by M. Bergstrom-Nielsen [De]; Organoleptic quality control in practice, by G. Jellinek [De]; Quality requirements of foods from the bacteriologist's viewpoint, by J. C. de Man & M. Flüge [De]; Problems of statistical-microbiological analysis of natural, heterogeneous fermentation processes: use of selective media for analysis of sauerkraut fermentation, by O. Balazs [De]; and Quality control of perishable foods to ensure the best possible quality of consumer goods, by E. Thode [En]. HBr

8 C 204
[Aflatoxins in foods.] Aflatoxine in Lebensmitteln. [A review]
Janicki, J.; Szebiotko, K.; Chelkowski, J.; Kokorniak, M.; Wiewiorowska, M.
Nahrung 16 (2) 85-98 (1972) [74 ref. De, en, ru] [Tech. Inst. für Landwirtschaftliche Produkte pflanzlicher Herkunft, Landwirtschaftliche Univ., Poznan, Poland]

On the basis of literature and their own experimental work (on use of suitable media), th authors review the occurrence of aflatoxins in foods, their biological effects, methods for their determination, and possibilities of detoxication. IN

8 C 205
Derivative method for chemical confirmation of identity of aflatoxin M_1.
Stack, M. E.; Pohland, A. E.; Dantzman, J. G.; Nesheim, S.
Journal of the Association of Official Analytical Chemists 55 (2) 313-314 (1972) [11 ref. En] [Div. of Chem. & Physics, FDA, Washington, DC 20204, USA]

A very sensitive chemical confirmatory test for aflatoxin M_1, involving the formation of 2 derivatives, has been developed. One derivative is the acetate of M_1, formed in a solution of acetic anhydride and pyridine; the other is formed from the acetate, using water and HCl, and is probably the hemiacetal. These derivatives are detected as fluorescent spots on TLC; They have been formed and detected from 1 ng aflatoxin M_1 and from M_1 isolated from milk, urine, and mould culture. AS

8 C 195
[Food hygiene.] Lebensmittelhygiene.
Anon. (Germany, W., Deutsche Veterinärmedizinische Gesellschaft; Austria, Österreichische Gesellschaft der Tierärzte)
Alimenta 8 (2) 46-51 & (3) 73-74 (1969) [De]

[Continued from preceding abstr.] The problem of whether results of individual analyses of boiling sausages for connective tissue, fat, protein, water and ash contents can be regarded as typical of whole batches, by D. Maier; Histological differentiation of fragments of external skin in sausages, by W. Thumser; Evaluation of canned goulash, by K. Gerigk; Determination of the proportion of muscle meat in products made from comminuted meat, by G. Krausse, G. Pfeiffer & H. Baas; Can incubated clear eggs be used as food?, by J. Kösters; Significance of psychrotrophic and psychrophilic bacteria for food hygiene, by W. Kundrat; Qualitative and quantitative aflatoxin determination by chemical and biological methods, by L. Bauer, H. R. Burmeister & L. Leistner; Enterotoxin-forming staphylococci in foods, by F. Untermann; Evaluation of the keeping qualities of meat products preserved by heating, by R. Heidtmann & -. Reichert; Bacterial content of commercial game, by K. Kniewaller; Bacteriological test methods for frozen fish, by K. E. Krüger; and Possibility of serological differentiation of fish, by C. Herrmann, A. Polymenides & D. Böhm. HBr

8 C 213
[Infrared spectroscopy of aflatoxins.] Zur Infrarotspektroskopie der Aflatoxine.
Bencze, K.; Kiermeier, F.
Zeitschrift für Lebensmitteluntersuchung und -Forschung 148 (4) 211-214 (1972) [8 ref. De, en] [Milchwissenschaftliches Inst., Tech. Univ., Munich, German Federal Republic]

A method for estimation of aflatoxins using IR spectroscopy and TLC was developed, by means of which it is possible to identify isolated aflatoxins at concn. of 8µg/KBr pellet. AS

8 J 1324

The incidence of aflatoxin in Sudanese groundnuts.
Habish, H. A.; Abdulla, M. H.; Broadbent, J. H.
Tropical Science **13** (4) 279-287 (1971) [8 ref. En] [Fac. of Agric., Univ. of Khartoum, Sudan]

This paper describes a preliminary survey of a large number of samples correlating extent of contamination with Aspergillus flavus and other kernel fungi with aflatoxin content of the kernels. 173 samples were taken during the 1969-1970 harvest season. Samples from the rainland of Western Sudan were collected from El Obeid ~6 wk after the beginning of the harvest and were considered to be representative of the groundnuts being grown over a reasonably wide area. Samples from the irrigate areas were taken from the field ~2 wk after the beginning of the harvest. Moisture content of the kernels was between 3-5%. % of damaged pods was >50% and they showed a higher level of fungal contamination than the sound kernels. Rainland samples had a higher incidence of kernel contamination than those from irrigated areas. Damaged kernels from El Obeid had the highest % of Asp. flavus. The majority of samples from irrigated areas were aflatoxin free, whereas in those from rainland areas none were free and 48% were classified low-medium, while 52% were in the high to very high category. Incidence of Asp. flavus was highest in those samples with very high and high levels of aflatoxin. Occurrence of Asp. niger, Penicillium spp., and Rhizopus spp. was fairly similar in all samples. Samples from the irrigated areas showed the highest incidence of Macrophomina phaseoli. AB

8 J 1416

International Aflatoxin Check Sample Program: 1971 study.
Coon, F. B.; Baur, F. J.; Symmes, L. R. L.
Journal of the Association of Official Analytical Chemists **55** (2) 315-327 (1972) [En] [WARF Inst. Inc., 506 N. Walnut St., Madison, Wisconsin 53701, USA]

An International Aflatoxin Check Sample Committee was formed in 1971 to establish a check sample programme of commodities or materials with aflatoxin contamination, which would be available to laboratories throughout the world. A set of 4 aflatoxin-contaminated peanut samples was prepared and mailed to 150 participating laboratories. Sufficient data were obtained from this study to permit a statistical comparison of 3 of the 4 AOAC methods for analysis of peanuts and peanut commodities. The analysis showed significantly higher means for the CB method (AOAC 26.015-26.020) than for the BF (AOAC 26.026-26.030) or Pons methods (AOAC 26.031-26.039) for 2 of the samples examined. AS

8 J 1417

Variation of aflatoxin content of cultures of Aspergillus flavus with duration of incubation and its relation to studies on aflatoxin production.
Arseculeratne, S. N.; Bandunatha, C. H. S. R.
Journal of Applied Bacteriology **35** (1) 43-52 (1972) [9 ref. En] [Dept. of Bact., Fac. of Med., Univ. of Ceylon, Peradeniya]

Strains of Aspergillus flavus recently isolated from coconut products were cultured on grated coconut. The aflatoxin content of serial cultures was found to vary significantly with duration of incubation and for some strains to show >1 phase of increase of aflatoxin content. The occurrence of these variations indicates that the study of aflatoxigenic capacity of strains or of the capacity of a medium to support toxin production, should be based upon a knowledge of the pattern of variations of toxin content with duration of incubation of the cultures under the experimental conditions used. Assay of toxin level in a culture after 1 period of incubation could lead to erroneous conclusions about the identity or quantities of toxin components which the strain is able to produce. AS

8 J 1443

Preparation of lot samples of nut meats for mycotoxin assay.
Stoloff, L.; Dantzman, J.; Wegener, J.
Journal of the American Oil Chemists' Society **49** (4) 264-266 (1972) [5 ref. En] [Bureau of Food, FDA, Washington, DC 20204, USA]

A procedure has been devised for preparing lot samples of mycotoxin-contained nut meats so that a representative analytical sample may be removed. The sample is rapidly reduced to coarse size. A relatively large portion (~1/10 of total sample) of subsample is then split out and further comminuted to a fine particle size with the aid of a fat solvent (meat-solvent, w/v, 3:2). The analytical sample is removed from this mixture. The procedure was rested with shelled almonds and shelled walnuts using radioactive nuts to simulate mycotoxin contamination and provide a simple, precise measure of contaminated nut meat distribution. The pooled coeff. of variation was 18% for subsamples and 4.4% for analytical samples. Considering the dilution factors used (1.50 and 2.14 contaminated nuts/10^4 nuts) and the low degree of reliability of the lot sample, the sample preparation methods tested appear to be practical and reliable. AS

8 T 416

[Condiment suitable for seasoning, developing characteristic flavour and preserving food products.] Mittel und Verfahren zum Würzen und zur Entwicklung des Eigenaromas sowie zum Frischhalten von Nahrungs- und Genussmitteln.
Takemoto, T. (Takeda Chemical Industries Ltd.)
West German Patent Application 1 517 125 (1969)

Condiments comprise tricholomic acid or ibotenic acid. They may be added in solid form, or as a water or alcohol solution, to fermented foods, sausages, meat and dairy products. They are preferably used with 5'-nucleotides and improve the flavour, keeping quality and fresh appearance of food. The flavour is mild, delicate and long-lasting. W&Co

9 H 1413

Analysis for aflatoxins in products containing alcohol.

Moor, J. L.

Journal of the Association of Official Analytical Chemists **55** (3) 573 (1972) [2 ref. En] [Food & Drug Administration, 50 Fulton Street, San Francisco, California 94102, USA]

The official first action method for aflatoxins in peanuts and peanut products, Method 1, 26.015-26.020, has been modified for application to products containing 10% or more alcohol. In the modified method, the sample is extracted with chloroform and filtered, and the entire chloroform extract is evaporated and cleaned up on a silica gel column, if necessary. The extract is spotted on a TLC plate and the aflatoxin is determined by fluorescence under UV light. Seven samples of wine and duplicate samples of an iron tonic were spiked with aflatoxin B_1; recoveries ranged from 90 to 100%. The sensitivity of this method is less than 1 µg/l. It is recommended that the method be subjected to a collaborative study. **AS**

9 Q 137

Bacterial penetration of eggs.

Vadehra, D. V.; Baker, R. C.

New York's Food and Life Sciences **5** (1) 9-11 (1972) [7 ref. En] [Dept. of Poultry Sci., St. Agric. Expt. Sta., Ithaca, New York, USA]

Importance of the cuticle, which "clogs" the pores of the shell, in prevention of egg spoilage is noted. The shell allows passage of micro-organisms because of its porous nature, but the shell membranes, particularly the inner membrane, are a very effective barrier. Experiments have shown that penetration by bacteria is not caused by a digestive process. Electrical charge of the penetrating molecule has been shown to be critical; the more negative the charge on the molecule the faster the penetration. Chelating agents such as EDTA and penicillamine also increased permeability of the membranes. Some bacteria possess chelating agents which would benefit penetration. Current research involves determination of the growth mechanism of food poisoning bacteria and mycotoxic fungi in albumen, yolk and poultry meat. **PG**

9 S 1152

Identification and aflatoxin production of moulds isolated from country cured hams.

Sutic, M.; Ayres, J. C.; Koehler, P. E.

Applied Microbiology **23** (3) 656-658 (1972) [15 ref. En] [Dept. of Food Sci., Univ. of Georgia, Athens, 30601, USA]

Of 562 moulds isolated from country cured hams, 403 isolates were of the genus Penicillium, 121 [as given. 123?] were Aspergillus, and 36 were Cladosporium, Alternaria, and other genera. **AS**

10 C 240

[Identification of aflatoxins in mould cultures and foods.]

Puscariu, F.; Deac, C.; Gabor, M.

Igiena **20** (10) 587-596 (1971) [25 ref. Ro, fr, de, en, ru] [Inst. de Sanatate Publica si Cercetari Med., Cluj, Roumania]

Toxinogenic moulds were detected in Sibiu salami by identification of the aflatoxins by TLC and biological methods. Aspergillus flavus and other Asp. species were also identified in salami, cornflour and corn cobs. [From En summ.] **HBr**

10 C 241

[Presence of toxinogenic moulds in foods.]

Deac, C.; Puscariu, F.; Lörinczi, F.; Gabor, M.

Igiena **20** (6) 337-344 (1971) [23 ref. Ro, fr, de, en, ru] [Inst. de Sanatate Publica si Cercetari Med., Cluj, Roumania]

Moulds grown experimentally or developing spontaneously on salami, smoked sausage, dry beans, corn cobs and domestic preserves wer examined. Aspergillus spp. were isolated from culture media and from food extracts (cornflour and peanuts) which produced substances similar to aflatoxin in fluorescence and toxicity. **ELC**

10 C 242

[UV-irradiation of aflatoxins in solid phase.] UV-Bestrahlung von Aflatoxinen in fester Phase.

Bencze, K.; Kiermeier, F.

Zeitschrift für Lebensmitteluntersuchung und -Forschung **148** (5) 279-285 (1972) [8 ref. De, en] [Milchwissenschaftliches Inst., D-8050 Weihenstephan, German Federal Republic]

In experiments with aflatoxins in solid phase, their reactions under UV irradiation were investigated. The results showed that changes start as radical reactions and depend on the available amount of oxygen. The stability of aflatoxins against UV light increases as follows: aflatoxin G_1,B_1, G_2, B_2. **AS**

10 C 247

[Spray reagent for detection of aflatoxins.]

Sprühreagens zum Nachweis von Aflatoxinen.

Mücke, W.; Kiermeier, F.

Zeitschrift für Lebensmitteluntersuchung und -Forschung **146** (6) 329-331 (1971) [15 ref. De, en] [Milchwissenschaftliches Inst. der Tech. Univ. München, Weihenstephan, German Federal Republic]

Fast Blue B salt (di-o-anisidine-tetrazolium chloride) forms violet-blue compounds with aflatoxins B_1 and B_2 and brown compounds with aflatoxins G_1 and G_2. This reaction allows identification of aflatoxins by silica gel TLC. The detection limits are 0.03 µg of aflatoxins B_1 and B_2 and 0.09 µg of G_1 and G_2. [See FSTA (1972) 4 4P481 for previous part.] **AFa**

10 C 253

[Nutrition 71. Pollution and its effect on foods.]
[Conference proceedings]
Debray, J.-R. (Chairman)
Cahiers de Nutrition et de Dietetique **6** (3) 23-82 (1971) [35 ref. Fr]

The following papers, presented on 21 April 1971, are included: Pollution - a new myth, by J. Tremolieres (pp. 25-28, 1 ref.); Pathogenic and toxin-producing microorganisms in foods, by R. Buttiaux (pp. 29-30); Pesticides in humans, by E. Fournier (pp. 31-35, 2 ref.); Toxins of fungal origin, by P. Lafont (p. 36); Residues in animal nutrition, by R. Ferrando (pp. 37-47, 32 ref.); Some recent work in the area of food toxicology, by R. Truhaut (p. 48); Substances formed during certain heat and radiation treatments, by J. Causeret (pp. 49-51); Plastics in contact with foods, by R. Lefaux (pp. 52-54); The destruction of plastics food packaging materials, by G. Le Moan (pp. 55-58); Dangerous foods and nutritional imbalance, by J. Tremolieres (pp. 59-62); The concern of consumers, by F. Custot (pp. 62-65); Precautions taken by producers, by J. Colas (pp. 66-67); Research on additives, pesticides and pollutants of foods, by R. Derache (pp. 68-69); The contribution of research towards protection from pollution, by P. Manchon & R. Lowy (pp. 70-71); and Protection brought about by regulations against the pollution of foods, by R. Souverain (pp. 75-78). A short discussion of the subject is included. SAC

10 G 503

[Colombian production of cottonseed cake. Quality evaluation in relation to processing.]
Buckle, T. S. de; Iregui, B. A.; Cardenas, O. S.; Chaves, O. G.
Revista del Instituto de Investigaciones Tecnologicas (Bogota) **13** (74) 19-35 (1971) [17 ref. Es]

The quality of cottonseed press cake obtained from different manufacturing stages and processes: expeller (Anderson-33 and -55, H.E.B., Krupp) and pre-press, with continuous or batch solvent extraction, was investigated with regard to its suitability as human or poultry food. Special attention was paid to gossypol and protein contents and available lysine. Details of analyses are shown in tables. Final press cake contained 40-48% protein and 8-14% fibre. Free gossypol fell throughout the process, chiefly during solvent extraction, only very little during precooking at low humidity. It was reduced to 0.03% during precooking at 12-14% humidity. Available lysine was >3.6 g/100 g protein in 80% of samples, fell in direct relation with heating and was correlated with soluble N (r = 0.965). Cyclopropenoid fatty acids were 50-300 ppm and directly correlated with residual oil (r = 0.956) between 0.7 and 9% of oil. 80% of samples were contaminated with aflatoxin. The study suggested that substantial quality improvements could be achieved by simple processing modifications (precooking and rolling of seeds). RM

10 J 1674

Diversion programme for farmers' stock peanuts with high concentrations of aflatoxin.
Dickens, J. W.; Satterwhite, J. B.
Oleagineux **26** (5) 321-328 (1971) [9 ref. En, Fr, es] [N. Carolina St. Univ., Raleigh, USA]

The programme for detecting lots of farmers' stock peanuts with high concn. of aflatoxin was examined. During the inspection, peanut lots found to contain Aspergillus flavus kernels were designated segregation-3, those not containing A. flavus and with low levels of damage, segregation-1. Tests to study the efficacy of the programme produced the following results: of >200 kernels identified as A. flavus infected during routine examination, 93% produced cultures of A. flavus. Average aflatoxin concn. in 364 composite samples from 3640 lots of segregation-3 peanuts was 203 parts/billion; concn. in samples from 2347 lots of segregation-1 peanuts was 14 parts/billion compared to 281 parts/billion in samples from 825 lots of segregation-3 peanuts marketed at the same time and place. 97% of samples from segregation-3, but 30% from segregation-1 contained measurable amounts of aflatoxin. Possible reasons are: A. flavus may not be visible, may not be included in the sample or aflatoxin may be produced by other fungi. The % A. flavus in loose shelled kernels average ~8 times that in unshelled peanuts in samples from 305 lots of segregation-3 peanuts. To increase accuracy of segregation, it is preferable to increase the number of loose shelled kernels examined. RM

11 A 472

[Taxonomic studies on the Japanese industrial strains of Aspergillus. XVI. Mycological characters of strains added after the previous report.]
Murakami, H.; Ohba, T.; Hara, S.; Shimizu, S.; Makino, M.; Takano, F.; Bizen, T.; Harada, M.
Report of the Research Institute of Brewing [Jozo Shikenjo Hokoku] **1971** (143) 1-4 (1971) [Ja, en] [Res. Inst. Brewing, Takinogawa, Kita-ku, Tokyo, Japan]

In addition to the genus Aspergillus hitherto studied, another 82 strains were examined for their morphological and physiological properties. None of the koji moulds produced aflatoxins (Af). Two strains of Aspergillus parasiticus, RIB 4032 (=IFO 4082) and RIB 4033 (=IFO 4301), produced Af abundantly colouring their conidia pink in the anisaldehyde media (MCH). One strain of Asp. parasiticus, RIB 1059 (=IFO 4204) for which its conidia did not turn pink in MCH, did not produce Af at all. The classification of strain RIB 1427 (=NRRL 1957), was confirmed as Asp. flavus link (See FSTA (1971) **3** 10A442 for part XV.) YN

11 A 474

[Taxonomic studies on the Japanese industrial strains of Aspergillus. XVIII. Moulds other than the koji mould and mycological characters of all strains.]

Murakami, H.

Report of the Research Institute of Brewing [Jozo Shikenjo Hokoku] **1971** (143) 16-30 (1971) [Ja, en] [Res. Inst. Brewing, Takinogawa, Kita-ku, Tokyo, Japan]

Among 406 strains which have been isolated from koji during the past 60 yr, 7 strains were contaminants of koji and were placed in Aspergillus flavus Link. Some strains received from abroad as aflatoxin producer were placed in Asp. flavus group. They were all described as wild mould in contrast to the koji mould. No contaminants of koji produced aflatoxins. Among the strains having both uniseriate sterigmata and echinulate conidia, those showing the pink conidia in the anisaldehyde medium were distinguished as Asp. parasiticus from the koji mould, and the strains having both biseriate sterigmata and echinulate conidia were identified with Asp. toxicarius. sp. nov., none of which have been found in koji. The outstanding characters and key to the group were shown and every 20 mycological characters of all strains hitherto studied were listed. YN

11 C 257

[Biological detection of mycotoxins in chickens with special reference to liver injuries.]

Mintzlaff, H.-J.; Christ, W.

Fleischwirtschaft **51** (12) 1802-1805 (1971) [26 ref. De, en] [Bundesanstalt für Fleischforschung, Kulmbach, German Federal Republic]

The organs, liver in particular, of chickens dosed with mycotoxins were examined to determine the lesion types that might develop. A hepatitis interstitialis lymphocytaria caused by several mycotoxins, but also inducible by other hepatotoxic substances, was observed histopathologically. The sensitivity of the chick to mycotoxins makes this bird suitable for detecting mycotoxin in foods, but more as a research tool for routine analysis. AS

11 C 282

Aflatoxin, an environmental carcinogen: effects of fat vehicle on the incidence and severity of aflatoxin-induced tumours in rats.

El-Ahraf, M. E.

Dissertation Abstracts International. Section B. The Sciences and Engineering **32** (7) 4039: Order no. 72-2806 (1972) [En] [Univ. of California, Berkeley, 94720, USA]

Two series of laboratory experiments were conducted to investigate the role of dietary fat source on the toxic and carcinogenic effects of low levels of aflatoxin in rats. Aflatoxin fed at low levels (≤0.5 and ≤1.0 ppb) as a natural food contaminant and in association with good quality protein (ground whole wheat, skim milk powder, lactalbumin or peanut protein) was reasonably tolerated by rats. Peanut oil exhibited a marginal protection but a definite role could not be concluded. The good quality protein fed in all diets might have masked any significant difference between the peanut oil and mixed fat (i.e. 15.1% beef fat, 1.0% cod liver oil, and 1.0% corn oil) as a source of fat. The dietary fat vehicle influenced the biological effects of aflatoxin; age at which aflatoxin was administered and dietary history of the animal influenced aflatoxin carcinogenic effects. The possibility of an etiological association between primary hepatoma in man and the presence of aflatoxin in his foods was investigated. It was concluded that though there is no direct evidence such relationship is possible. A control programme that emphasizes measures to safeguard foods against contamination and personnel against aflatoxin potential hazard is outlined. AA

11 G 541

Protein-enriched cereal foods for overcoming malnutrition among preschool children in India and other developing countries. [A review]

Swaminathan, M.; Daniel, V. A.; Parpia, H. A. B.

Indian Journal of Nutrition and Dietetics **9** (1) 22-48 (1972) [61 ref. En] [Central Food Tech. Res. Inst., Mysore, India]

Protein-enriched cereal foods for children are discussed, with reference to: amino acid content and nutritional value of cereal, oilseed, nut, legume and animal proteins; mutual supplementation; amino acid supplementation; production of oilseed meals and fish protein concentrate; effect of processing on nutritional value; deleterious constituents (haemagglutinins, trypsin inhibitors, goitrogens, gossypol, Se, oxalic acid, isothiocyanates, toxic glucosides and aflatoxins) in oilseeds and nuts; and large-scale production and distribution of protein-enriched products. Fortified cereal foods produced in India, Guatemala, Colombia, Mexico, Brazil, Argentina, Peru, Lebanon, Algeria, Turkey, Chile, USA, South Africa, Congo, Ehtiopia, Senegal, East Africa and Uganda are briefly described. AJDW

11 H 1774

[Investigations on the occurrence of aflatoxin in apple juice.] Untersuchungen über das Vorkommen von Aflatoxin in Apfelsaft.

Bösenberg, H.; Lentze, I.

Alimenta **11** (4) 133-134 (1972) [5 ref. De] [Hygiene-Inst., Univ., 44 Münster, Westring 10, German Federal Republic]

The presence of toxigenic fungi and formation of aflatoxin in apples were investigated. Examination of 561 mouldy apples from 6 cider producers and one apple growing area showed the presence of 769

strains of fungi, of which 13 were Aspergillus spp. (10 Asp. flavus). 8 of these 10 Asp. flavus strains produced aflatoxin B_1 and G_1 on rice culture; identification was by TLC and UV fluorescence. No aflatoxin was detected in extracts from apples or in 24 samples of commercial apple juice. No aflatoxin was formed when pieces of apple were inoculated with a highly toxigenic Asp. flavus strain, suggesting that apples are not a suitable medium for aflatoxin formation. RM

11 P 1680

[Aflatoxin formation in milk and milk products. VII. Difficulties in sampling foods containing aflatoxin.] Zur Aflatoxinbildung in Milch und Milchprodukten. VII. Zur Problematik der Probenahme in aflatoxinhaltigen Lebensmitteln.
Kiermeier, F.; Behringer, G.
Zeitschrift für Lebensmitteluntersuchung und -Forschung **148** (2) 72-76 (1972) [5 ref. De, en]
[Chem. Inst., Süddeutsche Versuchs- und Forschungsanstalt für Milchwirtschaft, Weihenstephan, German Federal Republic]

>100 samples distributed over a single Tilsit cheese were assayed semiquantitatively by TLC [see FSTA (1972) **4** 4P481 for part V] for aflatoxins B_1, B_2, G_1 and G_2. Assuming a tolerance limit of 5 µg/kg, 2 of 8 samples would have failed if only aflatoxin B_1 was considered whereas 6 of 8 would have failed if all 4 aflatoxins were considered. Regarding the distribution of aflatoxin in the cheese, 3-4 foci of infection could be deduced; this demonstrates the problems of sampling and setting legal limits. BR

11 T 590

[Microbiological studies of Korean soy-sauce fermentation. A study on the microflora of fermented Korean maeju loaves.]
Cho, D. H.; Lee, W. J.
1551ci 13 (1) 35-42 (1970) [19 ref. Ko, en]
[Coll. of Agric., Seoul Nat. Univ., Suwon, Korea]

5 samples of Korean maeju (fermented soybean mash) loaves were examined for their fermenting microorganisms. The fungal flora was only present on the outer layer of maeju loaves. The moulds found belonged to the genera, Mucor, Penicillium, Scopulariopsis, and Aspergillus. Only Bacillus subtilis and Bacillus sp. [B. pumilus] were present in the inner part of maeju loaves, although they also grew on the outer layer. Few yeasts were isolated. Different fermentation processes might have occurred in the outer and inner part of maeju loaves and resulting in a quite different appearance in the matured products. From microbiol ecological viewpoint the problem of aflatoxin in Korean soy sauce may not be critical. KoSFoST

11 U 745

Peanut butter.
Standards Association of Central Africa
Central African Standard CAS No. S31: 1971
17pp. (1971) [En] Price $0.90 [PO Box 2[illegible]
[illegible] Rhodesia]

This specification covers the requirements for smooth and crunchy peanut butter. Ingredient requirements cover: condition of ingredients, peanuts, salt, sweetening ingredients (sucrose, dextrose, liquid glucose, invert sugar, honey), and preservatives (antioxidants). General requirements include: ≥90% peanut content; good flavour and aroma, typical of freshly roasted peanuts, free from staleness, rancidity and objectionable flavour and odour; good bright colour, typical of roasted peanuts; suitable stabilization to minimize oil separation; and free from foreign matter, dirt and inorganic residue, and fairly free from brown/black seedcoat particles and scorched or discoloured peanut tissue. Requirements are listed for texture, microbiology (including aflatoxins), containers (types and condition), packing and processing (filling, exterior of containers, storage), labelling and marking, and sampling. Appendices give methods for determination of vacuum and net mass of contents, fill of container, and aflatoxin, and for incubation for microbiological examination. JA

12 C 288

[Protective measures when working with mycotoxins.] Schutzmassnahmen beim Arbeiten mit Mykotoxinen.
Tauchmann, F.; Mintzlaff, H.-J.; Leistner, L.
Alimenta **11** (3) 85-89 (1972) [10 ref. De, en]
[Bundesanstalt für Fleischforschung, Kulmbach, German Federal Republic]

Requirements for safe handling, testing and detoxification of material contaminated with mycotoxins are described. Chief detoxification materials are 4% NaOCl, 6N HCl, 1% $NaBO_2 \cdot H_2O_2 \cdot 3H_2O$, 1% $NaHCO_3$ and 5% formaldehyde. RM

12 C 295

[Hygiene of food and fodder in South America.]
[A review]
Mossel, D. A. A.
Scienza dell' Alimentazione **18** (5) 172-181 (1972) [53 ref. Fr, it, de, en] [Univ. San Marcos, Lima, Peru]

Certain components of compound feedstuffs, particularly fish and cottonseed flours originating from South America, have been shown to be carriers of salmonellae and mycotoxins. The sources of Salmonella contamination of fish flour manufactured in Peru and of Argentinian frozen beef and horse meat are discussed and methods for [illegible]. The prevention of [illegible] growth and thus of mycotoxin formation, is also discussed. [illegible]

12 C 301
Methods of aflatoxin analysis.
Jones, B. D.
Tropical Products Institute Reports **G70**: v + 58pp. (1972) [45 ref. En] [Tropical Products Inst. 56/62 Gray's Inn Road, London WC1X 8BLU, UK]

This report reviews some of the chemical methods available for the analysis of foods and feedingstuffs for aflatoxin, particularly those which are suitable for use in laboratories in developing countries. Sections of the report are as follows: Sampling methods and sample preparation for analysis; Defatting; Methods of toxin extraction; "Clean-up" procedures; Estimation of aflatoxin content of extracts by TLC; Confirmatory methods for aflatoxin B_1; Recommended sequence for the analysis of foods and feedingstuffs; and Calculation of the aflatoxin content of samples. 5 appendices are also included: Apparatus and chemicals required for the analyses; Suppliers of specialised equipment for aflatoxin analysis; Some suppliers of aflatoxin standards; Bulk sampling methods for aflatoxin analysis; and Determination of concentration and purity of aflatoxin standards. AA

12 C 302
Aflatoxins M_1 and M_2 and parasiticol: thin layer chromatography and physical and chemical properties.
Stubblefield, R. D.; Shotwell, O. L.; Shannon, G. M.
Journal of the Association of Official Analytical Chemists 55 (4) 762-767 (1972) [14 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

12 C 303
Quantitative fluorodensitometric measurements of aflatoxin B_1 with a flying-spot densitometer. I. Fluorodensitometric study of the behaviour of aflatoxin B_1 standard spots on different types of silica gel.
Beljaars, P. R.; Fabry, F. H. M.
Journal of the Association of Official Analytical Chemists 55 (4) 775-780 (1972) [10 ref. En] [Food Inspection Service, Florijnruwe 111, Maastricht, The Netherlands]

12 C 306
Collaborative study of the determination of aflatoxin in corn and soybeans.
Shotwell, O. L.; Stubblefield, R. D.
Journal of the Association of Official Analytical Chemists 55 (4) 781-788 (1972) [9 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

A study was made to determine whether the procedure commonly designated as the CB method, previously recommended for determining aflatoxin in peanuts and peanut products, could be applied to corn and soybeans. Both naturally contaminated and spiked corn and soybeans were extracted and analysed by TLC. Of the 15 collaborating [illegible] 9 were equipped to measure aflatoxins on TLC plates densitometrically, as well as visually. Seven collaborators used molar absorptivities to determine the concentration of aflatoxins in solutions to be used for TLC standards. The official CB method has been extended to include corn and soybeans, and the rapid TLC screening technique for aflatoxin in corn has been adopted as official first action. AS

12 C 315
[Detoxication of aflatoxins in aqueous solution.] Detoxifizierung von Aflatoxinen in wässriger Lösung.
Tauchman, F.; Leistner, L.
Fleischwirtschaft 49 (12) 1640-1641 (1969) [3 ref. De, en] [Bundesanstalt für Fleischforschung, Kulmbach, German Federal Republic]

Different treatments for detoxication of aflatoxins, while maintaining the organoleptic and nutritional qualities of foods, were studied using 100 parts/billion aflatoxin B_1 or G_1 in an aqueous (distilled or tap water) model solution. Detoxication methods studied included: storage for up to 30 days at 20°C, effect of light, heating at 120°C for 20 min, addition of 0.03% or 0.3% H_2O_2, addition of 0.4 or 0.8 mg Cl_2/l., use of charcoal filter (50 g/l. or 50 g/200 ml), and addition of 2 mg O_3/l. Best results were obtained with O_3, 0.8 mg Cl_2/l. and charcoal filter. Effects of storage, light, heat and H_2O_2 were very small. Aflatoxin G_1 was generally more easily destroyed than B_1. RM

12 C 317
[Fluorometric confirmation of aflatoxin detected in routine examinations.] Fluorometrische Bestätigung des Nachweises von Aflatoxinen in Routineuntersuchungen.
Toth, L.; Tauchmann, F.; Leistner, L.
Fleischwirtschaft 50 (3) 349-350 (1970) [12 ref. De, en] [Bundesanstalt für Fleischforschung, Kulmbach, German Federal Republic]

The confirmation of aflatoxins from routine assays by fluorometric spectra taken directly from TLC silica gel plates is described. The procedure uses an Aminco-Bowman Spectrophotofluorometer with a special accessory for TLC plates. Aflatoxins of the B and G groups can be differentiated by their emission maxima ($Em_{max.}$ 435 and 465 nm respectively), and individual aflatoxins by their R_f values. RM

12 M 1308
Aflatoxin contamination: association with foreign material and characteristic fluorescence in damaged corn kernels.
Shotwell, O. L.; Goulden, M. L.; Hesseltine, C. W.
Cereal Chemistry 49 (4) 458-465 (1972) [11 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

Samples of corn from commercial markets, previously shown to contain aflatoxin, were examined to determine the distribution of toxin within the bulk of the corn. A greenish-gold

fluorescence under ultraviolet light (365nm) was associated with the presence of aflatoxin. Damaged kernels with the characteristic fluorescence contained as high as 88.500 to 101.000 p.p.b. aflatoxin B_1, indicating that the toxin contamination could be concentrated within a few kernels in a corn sample. In two of thirteen contaminated corns examined, aflatoxin B_1 was found in high concentrations in the broken corn-foreign material, accounting for most of the toxin in the total sample of corn. AS

12 M 1348

Factor responsible for varietal differences in aflatoxin production in maize.

Nagarajan, V.; Bhat, R. V.

Journal of Agricultural and Food Chemistry **20** (4) 911-914 (1972) [15 ref. En] [Nat. Inst. of Nutr., Indian Council of Med. Res., Hyderabad-7, India]

Varietal differences in aflatoxin production in food grains is of considerable practical significance. The present study on seven hybrid varieties of maize indicated marked differences in aflatoxin production. Opaque-2 produced markedly low toxin, while Deccan hybrid produced maximal amounts. The possible reasons for the differences in toxin production have been investigated. Different extracts of the two varieties of maize (Opaque-2 and Deccan hybrid) have been incorporated into a standard synthetic medium and their ability to support toxin production has been examined. A 5% NaCl extract of Opaque-2 could result in almost total inhibition of the toxin production. Further fractionation of the NaCl extract revealed that the inhibitory factor is a protein of low molecular weight. The concentration of this protein is markedly higher in Opaque-2 than Deccan hybrid variety. AS

12 M 1399

[Aflatoxin B_1 content during bread manufacture.]

Das Verhalten des Aflatoxin B_1 im Verlauf der Brotbereitung.

Jemmali, M.; Lafont, P.

Getreide, Mehl und Brot **26** (7) 193-195 (1972) [11 ref. De] [Sta. de Biochimie et Physico-chimie des Cereales, INRA, 16, rue Nicolas Fortin, Paris, France]

Aflatoxin B_1 was mixed into flour, and its concn. was measured at various stages during bread making. Some desctruction of the mycotoxin took place during kneading and also during baking, but not much during proofing of the dough. The changes are hydrolytic and oxidative. However, not all aflatoxin B_1 was destroyed, and in the baking tests using flours with aflatoxin contents of 40-225 µg/kg, 10-40% of the aflatoxin was found to be present in the bread. AFa

12 N 612

Rapid quantitative TLC method for determining aflatoxins in cottonseed products. .

Pons, W. A., Jr.; Cucullu, A. F.; Franz, A. O., Jr.

Journal of the Association of Official Analytical

Regional Res. Lab., USDA, New Orleans, Louisiana 70179, USA]

The official AOAC method for aflatoxins in cottonseed products was modified to provide a rapid quantitative method whereby an analysis can be completed in as little as 1 h. The method incorporates a choice of either 5 min blender or 30 min shaker extraction and either half-plate (20 min) or full-plate (50 min) TLC development to provide a flexible method to meet different analytical requirements. The rapid method was compared with the official AOAC method and the ferric gel method of Velasco for determining aflatoxins in 10 samples of cottonseed kernels and 14 samples of meals. With kernels, all 3 methods were essentially equivalent up to a contamination level of 3800 µg/kg. For quantities above this level, results by the official method were 77% of those obtained by the other 2 methods. With meals, both the rapid and official methods were equivalent for aflatoxin B_1, but interferences were ecountered at the R_f value of B_2 on TLC plates in 3 of the 14 samples analysed by the rapid method. With the ferric gel method, interferences at the R_f values of aflatoxin B_1 or B_2 were encountered in 9 of the 14 samples, and the B_1 estimates by this method averaged 87% of that found for the rapid or official methods. AS

12 P 1814

[Examination for aflatoxins of moulds used in cheesemaking and of mould-ripened cheeses.]

Bulinski, R.

Roczniki Instytutu Przemyslu Mleczarskiego **14** (1) 35-41 (1972) [34 ref. Pl, ru, en] [Katedra Nauki o Srodkach Spozywczych i Higieny Zywienia, AM, Lublin, Poland]

8 strains of Penícillium candidum, 8 of Penicillium camemberti and 8 of Penicillium roqueforti, used by Polish cheese factories, were cultured for 5 days on an agar medium at 18-20°C, then dried extracted with light petroleum, and the residues were examined by TLC for production of aflatoxins. [See FSTA (1969) 1 9M627]. 40 samples of dried defatted Camembert-type cheese and 40 samples of dried defatted Rokpol cheese were similarly examined. No aflatoxin B_1 or G_1 was detected in any of the mould strains or cheese samples examined. SKK

12 P 1872

Mycotoxins in feedstuffs and their effect on dairy cattle.

Lynch, G. P.

Journal of Dairy Science **55** (9) 1243-1255 (1972) [131 ref. En] [Animal Sci. Res. Div., USDA, Beltsville, Maryland 20705, USA]

Toxins produced by Aspergillus, Fusarium and Penicillium spp., and other fungal toxins reported in feedstuffs, are reviewed with particular reference to their possible effects on dairy cattle and other livestock and to residues of aflatoxins in tissues and milk of cattle and sheep. CDP

12 P 1913

Determination of aflatoxin M_1 in raw milk: A modified Jacobson, Harmeyer and Wiseman method.

McKinney, J. D.

***Journal of the American Oil Chemists' Society* 49** (7) 444-445 (1972) [2 ref. En] [Ranchers Cotton Oil, Fresno, California 93708, USA]

The method, based on that described in FSTA (1971) 3 7P1084, is as follows: 75 ml raw milk is blended with 300 ml methanol and filtered through Celite 545 to remove precipitated protein. The filtrate is adjusted to 50% methanol by the addition of 4% NaCl solution, and the lipids removed by extraction with hexane. Aflatoxin M_1 is then extracted from the fat-free methanol solution with chloroform. The dry residue from the chloroform solution is dissolved in an appropriate volume of chloroform and analysed by TLC on silica gel using isopropyl alcohol-acetone-chloroform (5:10:85 v/v/v) as developing solvent. The concn. of aflatoxin M_1 is estimated by visual comparison of the fluorescent and test spots under UV light. Aflatoxin M_1, added to raw milk at a level of 0.0003 ppm, was 80% recovered. The method should allow the detection of 0.0001 ppm aflatoxin M_1 in raw milk. MEG

12 S 1633

[Aflatoxin production on meats.] Aflatoxinbildung in Fleischwaren.

Burmeister, H. R.; Leistner, L.

***Fleischwirtschaft* 50** (5) 685 (1970) [16 ref. De, en] [Bundesanstalt für Fleischforschung, Kulmbach, German Federal Republic]

The production of aflatoxin was investigated by inoculating 7 types of sausage with a toxigenic strain of Aspergillus flavus (NRRL 2999) and storing 14 days at 15° or 25°C and high RH. At 25°C, all types of sausage contained aflatoxin, the highest concn. being 26 100 parts/billion (ppb) B_1 and 18 000 ppb G_1 in Jägersalami. Much less was produced at 15°C. Although Asp. flavus and Asp. parasiticus occur only rarely on meat products, they can cause large toxin production when present, especially at higher temp. RM

12 S 1645

Extraction and determination of Aspergillus flavus metabolites. Aflatoxins from meat products.

Strzelecki, E. L.

***Acta Microbiologica Polonica, B* 21** (3) 155-164 (1972) [17 ref. En, pl] [Vet. Hygiene Res. Sta., 10 Kaprow St., Gdansk 5, Poland]

Standard aflatoxins were added to salami, raw ham, and home-cured ham samples in order to elaborate the best analytical procedure for detection of aflatoxins. Filtered aqueous meat methanolic extract was defatted using petroleum ether:benzene:hexane in the proportions 2:1:2 followed by TLC, with spot identification under UV light. 30 different combination of TLC solvents were investigated. Best resolution of aflatoxins was obtained using a solvent composed of hexane:petroleum ether:benzene:chloroform:acetone in the proportions 10:10:10:60:10. OA

12 T 631

[Microbiological impurities in enzyme preparations for food technology. Aflatoxin and antibiotic residue activities.] Mikrobiologische Verunreinigungen in Enzympräparaten für die Lebensmitteltechnologie. Aflatoxin and antibiotische Restaktivitäten.

Frank, H. K.

***Deutsche Lebensmittel-Rundschau* 68** (8) 252-256 (1972) [10 ref. De, en, fr] [Inst. für Physik & Biol., Bundesforschungsanstalt für Lebensmittelfrischhaltung, Engesserstrasse 20, 75 Karlsruhe 1, German Federal Republic]

80 enzyme preparations (amylases, pectinases, invertases, proteases) used in food processing were analysed for aflatoxin and antibiotic residues. Aflatoxin B_1 was found in 1 sample. 2 other samples showed aflatoxin-like spots on TLC plates but were not confirmed as aflatoxins. Bio-assays using Bacillus stearothermophilus showed 27% of the samples, especially pectinases and proteases, to contain antibiotic residues from 0.003-1.0/g of IU-penicillin equivalents. The results are discussed with reference to national and international specifications for enzyme preparations. OA

12 U 787

[Possibilities of food-supervision in the quality control of foods.] Möglichkeiten der Lebensmittelüberwachung zur Qualitätskontrolle bei Lebensmitteln. [A lecture]

Muskat, E.

***Ernährungs-Umschau* 19** (8) 279-283 (1972) [5 ref. De] [Staatlich-Chem. Untersuchungsamt, Giessen, German Federal Republic]

Inspection of foods is discussed with reference to chemical, toxicological, nutritional, physiological, and legislative aspects. Guidelines for inspection of canned goods, milk, chicken, fish- and meat-products are given. Incidence of heavy metals, chemotherapeutics, pesticides and aflatoxins is considered and development of specially-tailored instrumental analytical methods to cope with increasing sophistication of food-adulteration is advocated. OA

COPYRIGHT REGULATIONS

FORM OF DECLARATION AND UNDERTAKING

To the Editor, International Food Information Service, Shinfield,
Reading, RG2 9AT, Berkshire, England.

1. I ....

of ....

hereby request you to make and supply to me a photocopy of the article covered by

Journal name ....

Volume .... Part .... Pages .... Year ....

which I require for the purpose of research or private study.

2. I have not previously been supplied with a copy of the said article/part of the said work by any librarian.

3. I undertake that if a copy is supplied to me in compliance with the request made above, I will not use it except for the purpose of research or private study.

Signature* .... Date ....

(*Note: This must be the personal signature of the person making the request. A stamped or typewritten signature or the signature of an agent is NOT sufficient).

4. Send this form and remittance (10p per page) to the above address.

(Note: Additional forms are available on request).

Additional Services available from IFIS

RETROSPECTIVE SEARCH SERVICE

- ▶ Over 60,000 documents in FSTA searched
- ▶ State-of-the-art or "quicky" telephone requests accepted
- ▶ Annual contracts with discount available
- ▶ Cost from £5 per volume of FSTA for references; £7.50 per volume for abstracts
- ▶ Information available in 3 output formats
- ▶ Searches conducted by qualified food science graduates

PHOTOCOPYING SERVICE

- ▶ All journal articles abstracted in FSTA available promptly
- ▶ Cost 7p per page for single orders
- ▶ Deposit account service in operation
- ▶ Original articles available as output from retrieval services at 40p per article.

See also inside front cover

FOOD ANNOTATED BIBLIOGRAPHIES

Selected abstracts from Food Science and Technology Abstracts on important specialized aspects of food science and technology are now available as Food Annotated Bibliographies (FABs).

The FABs already completed are listed below, and further FABs are in preparation. Suggestions are welcomed for specific topics for additional bibliographies.

FAB	Title	No. Ref.	Price	Vol. 1-3	No. Ref.	Price	Vol. 4	Vol. 5 (1973) Monthly (12 issues)	
1.	Application of Reverse Osmosis to Food Processing	104	£2.00	☐	58	£2.00	☐	£4.00	☐
2.	New Sources of Food Protein	662	£6.00	☐	332	£3.50	☐	£9.00	☐
3.	Natural and Synthetic Sweeteners	338	£3.50	☐	198	£2.00	☐	£6.00	☐
4.	Techniques for Analysis of Flavour Volatiles	367	£4.00	*☐	237	£2.50	☐	£7.00	☐
5.	Microwaves in Food Processing	160	£2.00	☐	103	£2.00	☐	£5.00	☐
6.	Texture Analysis of Foods	426	£4.50	*☐	429	£4.50	☐	£11.00	☐
7.	Synthetic Dairy Products	150	£2.00	☐	88	£2.00	☐	£4.00	☐
8.	Acidulants in Foods	413	£4.50	☐	200	£2.50	☐	£7.00	☐
9.	Agglomeration of Powders	73	£2.00	☐	34	£2.00	☐	£4.00	☐
10.	Aseptic Packaging	131	£2.00	☐	79	£2.00	☐	£4.00	☐
11.	EEC Regulations	55	£2.00	☐	64	£2.00	☐	£4.00	☐
12.	Toxicology of Food Additives	118	£2.00	☐	106	£2.00	☐	£5.00	☐
13.	Deep Fat Frying	400	£4.00	☐	248	£2.50	☐	£7.00	☐
14.	Viscosity of Foods	399	£4.00	☐	212	£2.50	☐	£7.00	☐
15.	Taste Panels in Food Science	78	£2.00	☐	86	£2.00	☐	£4.00	☐
16.	Taints in Foods	126	£2.00	☐	77	£2.00	☐	£4.00	☐
17.	Microbial Toxins in Foods	113	£2.00	☐	87	£2.00	☐	£4.00	☐
18.	Smoked Food Products	249	£2.50	☐	112	£2.00	☐	£5.00	☐
19.	Disposal of Waste Food Products	395	£4.00	☐	262	£3.00	☐	£8.00	☐
20.	Use of Glucose in Food Products	124	£2.00	☐	99	£2.00	☐	£4.00	☐
21.	Emulsifiers in Foods	253	£3.00	☐	161	£2.00	☐	£6.00	☐
22.	Stabilizers in Food	222	£2.50	☐	250	£3.00	☐	£8.00	☐
23.	Staling and Anti-staling Additives	58	£2.00	☐	25	£2.00	☐	£4.00	☐
24.	Catering Industry	51	£2.00	☐	29	£2.00	☐	£4.00	☐
25.	Antioxidants (in preparation)								
26.	Nitrosamines	31	£2.00	☐	32	£2.00	☐	£4.00	☐

*Vol. 1-2 only

☐ Suggested topics for FABs........................

SDI and Retrospective Searches

The International Food Information Service is now able to provide selective dissemination of information and retrospective searches.

☐ I require an SDI/Retrospective Search on the following topics.

Please send me an estimate.....

Prices include postage by surface mail. For airmail rates, please apply to the address below.

To order, or to obtain further information, mark the item required, add your name and address, and send cash, cheque or postal order to:

International Food Information Service,
Commonwealth Bureau of Dairy Science and Technology,
Shinfield, Reading RG2 9AT, England.

Name ....

Address ....

....

....

INTERNATIONAL FOOD INFORMATION SERVICE

ifis

FAB 34

February 1974

AFLATOXINS

SELECTED FROM VOLUME 5
FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

PRICE £2.00

sponsored by

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks; Institut für Dokumentationswesen, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen; Zentralstelle für maschinelle Dokumentation, Frankfurt am Main.

Additional Services available from IFIS

CURRENT AWARENESS SERVICE

- Monthly searches of FSTA
- Personalized, computer assisted service
- Information available in 3 output formats
- Cost from £10 per year for references; £15 per year for abstracts
- Information selected to match your requirements on any aspect of Food Science and Technology

MAGNETIC TAPES

- Contains all information in FSTA, bibliographic data, abstracts, author and subject indexes
- 7– and 9– track IBM tapes available
- "Clean" tapes suitable for computer retrieval
- Cost £700 per year

Enquiries concerning the magnetic tape service should be addressed to;–

Dr. U. Schützsack
Institut für Dokumentationswesen,
6 Frankfurt/Main-Niederrad,
Herriostrasse, W. Germany.

See also back page

AFLATOXINS

VOLUME 5

FOOD ANNOTATED BIBLIOGRAPHY No. 34

ifis

© INTERNATIONAL FOOD INFORMATION SERVICE,
LANE END HOUSE, NIRD,
SHINFIELD, READING, RG2 9AT,
ENGLAND.

ISBN 0 86014 040 7

First published in 1974

INTRODUCTION

Food Annotated Bibliographies (FABs) are collections of abstracts on specific topics in food science and technology. The topics are chosen by the staff of the International Food Information Service as being of particular interest or importance. The topics normally interest individual workers, who may not require the full information provided in Food Science and Technology Abstracts, from which the abstracts for the FABs are taken. The size and the cost of the FABs are controlled as much as possible with the interests of individual workers in mind.

Titles of the FABs now available are given on the back cover of this booklet. New titles are being added at the rate of about 10-20 per year. For up-to-date lists of FABs or suggestions for new topics please write to the address given overleaf. New subjects are searched for at least the five most recent volumes of Food Science and Technology Abstracts. Thereafter each FAB is updated monthly. Copies of each months abstracts on any topic may be obtained as indicated on the back cover of this publication. At the end of each volume of up-dating, the abstracts are merged and made available as a separate supplement to the original FAB.

Some of the larger FABs have been divided into sections to facilitate use. Abstracts are not printed in more than one section. The larger FABs also have subject indexes provided.

Copies of all original articles referred to in the abstracts may be bought (or occasionally borrowed) from the International Food Information Service. A form for ordering these is provided at the end of this FAB.

Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journals, patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would in any case encourage readers to write or telephone us with any comments or queries they may have.

J. NEWTON
ASSISTANT EDITOR

1 C 13

Dichlorvos as an inhibitor of aflatoxin production on wheat, corn, rice, and peanuts.

Rao, H. R. G.; Harein, P. K.

***Journal of Economic Entomology* 65** (4) 988-989 (1972) [13 ref. En] [Univ. of Minnesota, St. Paul, USA]

Wheat, corn, rice, and peanuts were treated with various amounts of dichlorvos either before or after inoculations with Aspergillus flavus Link. Dichlorvos at an intended deposit of 20 ppm on wheat before inoculation prevented aflatoxin production. Aflatoxin production was greater when the dosage of dichlorvos was reduced below 20 ppm, the treatment followed inoculation rather than before inoculation or when the substrate was either corn, rice, or peanuts instead of wheat. AS

1 C 15

[Present state of mycotoxin research.]

Gegenwärtiger Stand der Mycotoxin-Forschung.

Meyer, H.; Leistner, L.

***Fleischwirtschaft* 50** (10) 1414-1415 (1970) [5 ref. De, en] [Bundesanstalt für Fleischforschung, Kulmbach, Federal Republic of Germany]

The progress of mycotoxin research since 1890 is briefly discussed. The 63 mycotoxins known are listed according to their degree of toxicity. At present about 240 toxigenic mould-species are known, of these 75 are listed. AS

1 C 16

[Bibliography of aflatoxin literature from 1960 to 1969.] Bibliographie der Aflatoxin-Literatur von 1960 bis 1969.

Meyer, H.; Leistner, L.

***Fleischwirtschaft* 50** (1) 81-82 (1970) [5 ref. De, en] [Bundesanstalt für Fleischforschung, Kulmbach, Federal Republic of Germany]

The bibliography, which is briefly described, is available from the authors. It contains about 1200 references arranged into 34 sections. RM

1 C 17

Production of aflatoxin in a medium fortified with sodium chloride.

Shih, C. N.; Marth, E. H.

***Journal of Dairy Science* 55** (10) 1415-1419 (1972) [20 ref. En] [Dept. of Food Sci., Univ. of Wisconsin, Madison, 53706, USA]

A liquid medium with 2% yeast extract, 20% sucrose and 1-14% NaCl was inoculated with Aspergillus flavus or Asp. parasiticus and incubated at 21, 28 or 35°C for 7 days. Aflatoxin in the medium or mould mycelium was determined by TLC and fluorometry. Aflatoxin production by Asp. flavus and Asp. parasiticus was enhanced by 1 and 2% NaCl at 28 and 35°C, and by 1-3% NaCl at 21°C; more NaCl reduced toxin production at all 3 temp., 8% NaCl completely inhibiting toxin synthesis by both species at 21°C, but allowing both species to form some toxin at 28 and 35°C; 14% NaCl completely inhibited growth and toxin formation by both species at 28°C. Low concn. of NaCl increased loss of toxin by the mycelium into broth, whereas high concn. suppressed it. Both the concn. of NaCl and incubation temp. should be considered when salted foods are stored under conditions which permit mould growth. AS

1 G 9

Technology of production of edible flours and protein products from groundnuts.

De, S. S.; Cornelius, J. A. (Food & Agriculture Organization)

***Agricultural Services Bulletin, Food & Agricultural Organization* No. 10**, vi+88pp. (1971) [43 ref. En] [Rome, Italy]

6 chapters are included: Introduction (description, composition, production of groundnuts) (pp. 1-9, 5 ref.); Oil milling principles (pp. 10-12, 2 ref.); Production of protein products including isolates and extracts (pp. 13-24, 17 ref.); Industrial production of edible flour (pp. 25-63); Oil milling operations in selected countries (pp. 64-76, 3 ref.); Formulation, packaging and storage (pp. 77-79, 8 ref.). 2 appendices are included: Background information on aflatoxin (pp. 80-84, 8 ref.) and an Alphabetical list of equipment suppliers (pp. 85-88). VJG

1 G 32

Effects of γ radiation on peanuts, onions and ginger.

Gonzalez, O. N.; Dimavnahan, L. B.; Pilac, L. M.; Alabastro, V. Q.

***Philippine Journal of Science* 98** (3/4) 279-293 (1969, publ. 1972) [17 ref. En] [Nat. Inst. of Sci. & Tech., Manila, Philippines]

Preliminary trials on shelled dried peanuts showed that irradiation doses of 50-200 kr did affect their acceptability and TBA (thiobarbituric acid) values. Microbial counts decreased as irradiation dose increased. Postirradiation studies after 0, 50, 100 or 150 kr indicated that aflatoxin contamination was prevented at 100 and 150 kr during 10 months' storage at 27-30°C, acceptability scores for all samples decreased, free fatty acid and moisture values increased slightly. Total microbial count after 10 months was 300 after 0 kr, 150 after 50 and 100 kr, 100 after 150 kr. Mould and yeast growth was completely inhibited by 100 or 150 kr, and stabilized at 50 colonies/g after 10 kr. Postirradiation studies on onions (red creole and white) and ginger (Hawaiian variety) showed that irradiation of 5-15 kr inhibited sprouting and reduced rot decay without affecting initial acceptability. Higher irradiation levels reduced acceptability after storage, indicating that 4-5 kr was sufficient to prevent sprouting. Effects of lower doses require further study. RM

1 G 63

Microbial attack on cellulosic materials from groundnut cake.

Bhattacharyya, A. K.; Tamhane, D. V.

***Current Science* 41** (5) 178-179 (1972) [12 ref. En] [Dept. of Chem. Tech., Univ., Matunga, Bombay-19, India]

A number of microbes have been screened for hydrolysis of oilseed cakes, with the object of

facilitating extraction of protein, enrichment of the cake with microbial protein, and destruction of aflatoxin. Fermentation of groundnut cake slurry containing 70% water with Streptomyces albus gave a 5% increase in protein in 3 days. Preliminary studies show that the organism could also attack cellulosic materials from mustard and linseed cakes. PG

1 P 49

Reduction of the aflatoxin M content of milk processing.

Purchase, I. F. H.; Steyn, M.; Rinsma, R.; Tustin, R. C.

Food and Cosmetics Toxicology **10** (3) 383-387 (1972) [13 ref. En, fr, de] [Nat. Res. Inst. for Nutr. Diseases, Private Bag 380, Pretoria, South Africa]

Milk from Friesland cows which were given a daily oral dose of 20-35 mg crystalline aflatoxin B_1 was collected over a period of 5 days, bulked and stored at 4°C before processing by (i) freeze-drying, (ii) pasteurization, (iii) evaporation, (iv) roller-drying, (v) sterilization or (vi) spray-drying. Aflatoxin M content of the processed milks was measured by TLC on silica gel using acetone/chloroform (25:75 v/v) and in (i) and (vi), by the duckling bioassay; it was found to decrease with increasing processing temp. Values for aflatoxin M obtained by the chemical assay (µg/kg milk) were (i) 385, (ii) 260 (62°C for 30 min); 210 (72°C for 45 sec); 140 (80°C for 45 sec), (iii) 140, (iv) 150 (under reduced pressure); 94 (at 4.9 kg/cm^2), (v) 72 and (vi) 52. The duckling bioassay confirmed the reduced toxicity of (vi) compared with (i). Cottage cheese prepared from the contaminated milk contained no detectable aflatoxin M; the activity (160 µg/kg) was present in the whey. MEG

2 A 127

Advanced analytical instrumentation.

Leslie, R. C.

Food Manufacture 47 (11) 41, 43, 46 (1972) [En] [Perkin-Elmer Ltd., Beaconsfield, Bucks, UK]

The various analytical instruments and techniques described are classified into 2 categories; (i) those which separate mixtures and (ii) those which identify single components or measure some physical property which can be related to chemical or physical structure. Included in (i) are: the use of gas-liquid and liquid-solid chromatography for the analysis of complex mixtures, e.g. essential oils and meat flavours; TLC for the separation and identification of pesticide residues in cereals, vegetables and fruit; analysis of halogen-containing residues using the electron capture detector; and liquid chromatography for the separation of lipids, antioxidants, oligosaccharides, food colours and for the resolution of aflatoxins B_1 and G_1. In (ii) details are given of: spectrophotometry; UV and visible absorption spectroscopy and their use for the quantitative determination of artificial colourings and assay of antioxidants, preservatives, additives, and pesticides present in foodstuffs; atomic absorption and its use in the determination of toxic elements such as As, Pb, Cd, Co, Zn, Sn and Hg in foodstuffs; the application of IR analysis to the identification of organic substances e.g. characterization of essential oils, determination of BHT in fats and the identification of preservatives extracted from meat; emission spectroscopy for quantitative analysis and simultaneous determination of several elements e.g. Na, K; fluorescence emission measurements for the determination of thiamine, riboflavine, other vitamins, lecithin, aromatic amines and carbohydrates; and elemental and thermal analysis. AA

2 A 129

Chemistry for consumers. [Review]

Reynolds, H. L.; Eiduson, H. P.; Weatherwax, J. R.; Dechert, D. D.

Analytical Chemistry **44** (13) 22A-24A, 26A, 28A, 31A-34A (1972) [26 ref. En] [FDA, Washington, DC, USA]

This review traces the historical development of the FDA and discusses some of the problems which form part of its work e.g mycotoxins, Hg in food, pesticides, and polychlorinated biphenyls. JA

2 B 14

Experiments on aflatoxin translocation to the commercial mushroom. [Conference proceedings]

Mattoni, R. H. T.; Acker, D.; Marx, P. F. B.; Blank, B. B.; Nishida, J.

Mushroom Science **8**, 315-319 (1972) [8 ref. En, fr, de] [Int. Microbiol. Products, Inc., Hawthorne, California, USA]

The experiment reported herein, in combination with an earlier experiment, demonstrates that the aflatoxin present in composts containing contaminated cottonseed or peanut meals are not concentrated in sporophores of the commercial Agaricus bisporus. The data indicate that the toxins are destroyed by metabolic processes which take place during composting phases I & II. The degradation continues during spawn run, but there are no evidences of whether the mushroom mycelia participate. The heuristic value of the experiments is to alleviate fears of aflatoxin transfer, translocation, and concentration and safely permit use of low price contaminated meals as compost supplements. AS

2 C 32

Detection of orally toxic microbial metabolites in foods with bioassay systems.

Waart, J. de; Aken, F. van; Pouw, H.

Zentralblatt für Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, IA **222** (1) 96-114 (1972) [59 ref. En, de] [Central Inst. for Nutr. & Food Res. TNO, Zeist, The Netherlands]

A total of 32 biological test systems, including 6 protozoa, 4 fish species, 5 insect types, bull spermatozoa, 4 cell lines, 9 microorganisms, embryonated hens' eggs and Daphnia and Artemia, were studied for sensitivity to 10 toxins of microbial origin: 2 aflatoxins, 3 botulinum toxins, 2 Escherichia coli-toxins, 2 staphylococcal enterotoxins and histamine. No assay system with significant sensitivity to all the toxins tested was discovered. Selective sensitivities established by others, while this study was in progress [de Waart, Antonie van Leeuwenhoek (1967) **33**, 230], were confirmed. Some protozoa, fish, Artemia and, particularly, Daphnia were found sensitive to clinically significant concn. of histamine, Locusta migratoria and 2 human cell lines to staphylococcal enterotoxins, while Daphnia and 3 fish species were found sensitive to very low concn. of aflatoxin B_1. **AS**

---

2 C 38

Tracheal organ cultures for the bioassay of nanogram quantities of mycotoxins.

Cardeilhac, P. T.; Nair, K. P. C.; Colwell, W. M.

Journal of the Association of Official Analytical Chemists **55** (5) 1120-1121 (1972) [3 ref. En] [Dept. of Vet. Sci., Univ. of Florida, Gainesville, 32601, USA]

See also FSTA (1970) **2** 5C87.

2 C 53

A confirmatory test for aflatoxin B_1.

Mathew, C. P.

Research and Industry, India **17** (1) 28 (1972) [8 ref. En] [Dept. of Chem., Christian Med. Coll., Vellore 2, India]

TLC isolation of aflatoxin B_1, the most toxic of the aflatoxin group, is said to be complicated by interference from other aflatoxins and non-aflatoxins. A standardized, improved TLC method for detection of aflatoxin B_1 at the 1 μg level, based on the formation of a derivative which fluoresces blue in UV light, is described. R_f value of the aflatoxin B_1 derivative was 0.7 as opposed to 0.56 for pure aflatoxin B_1. Positive separation and identification were achieved. **OA**

2 C 54

[Evaluation of methods for quantitative determination of aflatoxin B_1 in groundnut press cake.]

Kmieciak, S.; Niewiadomski, H.

Revue Francaise des Corps Gras **19** (7) 455-460 (1972) [17 ref. Fr, de, en, es] [Lab. Central de Chim. P.P. Polcargo, Gdynia, Poland]

Quantitative determination of aflatoxin B_1 in groundnut meal by different methods was studied. Results from 3 samples by the AOAC method using short extraction with methanol and water 55:45 were about 50% lower than those by the Dutch R method, chloroform extraction by the TPI method [Analyst (1965) **90**, 305] and the official Polish method. With 13 samples, TPI method gave a mean value of 0.734 mg/kg vs. 0.345 by AOAC method. Increasing extraction time from 1 to 10 min and number of extractions from 1 to 3 produced no improvement. Comparative recovery tests indicated incomplete extraction of aflatoxin by the AOAC method from samples with low oil content (0.5-1%). Optimum extraction was achieved with chloroform. Best TLC separation was obtained with chloroform:acetone (90:10) on silica gel HR Merck or D5 Camag. Variance and limits of confidence were calculated for visual measurement of fluorescence in 2 samples ($v = 13.4$ and 15.7%). **RM**

---

2 J 231

After-cooking discolouration of potatoes.

Vertregt, N.

European Potato Journal **11** (4) 226-234 (1968) [9 ref. En, de, fr] [Inst. voor Biol. en Scheikundig Onderzoek van Landbouwgewassen (IBS), Wageningen, The Netherlands]

Differences in after-cooking blackening between different varieties of potatoes were found to be due to differences in the chlorogenic acid content. There is no discolouration when the chlorogenic acid content is sufficiently low and the citrate content is high. The citrate content and tissue pH are controlled to some extent by the K level. A method is described for determining chlorogenic acid in fresh tubers. **AS**

2 J 293

[Studies on mycotoxins in foods. I. Detection of aflatoxins in peanuts and peanut products.]

Kimura, Y.; Naoi, Y.; Tomomatu, T.; Ogawa, H.; Kazama, E.; Saito, K.; Eguchi, Y.

Annual Report of Tokyo Metropolitan Research Laboratory of Public Health **22**, 87-93 (1970) [29 ref. Ja, en] [Dept. of Food Hygiene, Tokyo Metropolitan Res. Lab. of Public Health, Japan]

A modification of the AOAC method [Official Methods of Analysis of the Association of Official Analytical Chemists (1971) 426-438] was used for the detection of aflatoxin in raw and processed peanuts. 8 of the 30 samples examined contained aflatoxin B_1. Using this method, aflatoxin B_1 was not detected in the fermented soybean paste, miso. [From En summ.] **AA**

2 N 70

Fast screening method for detection of aflatoxin contamination in cottonseed products.

Cucullu, A. F.; Pons, W. A., Jr.; Goldblatt, L. A.

Journal of the Association of Official Analytical Chemists 55 (5) 1114-1119 (1972) [14 ref. En] [S. Regional Res. Lab., USDA, New Orleans, Louisiana 70179, USA]

The detection method incorporates a 3 min blender extraction of the sample with aqueous acetonitrile, followed by partition of aflatoxins from an aliquot of the extract into benzene to effect a 4-fold concentration of the aflatoxins. A millicolumn (4 mm inner diam. × 20 cm long) filled with zones of acidic alumina (1.5 cm) and silica gel (9 cm) is placed in a portion of the benzene extract and the column is developed 5 min in chloroform-acetonitrile-2-propanol. Aflatoxins are detected by the presence of a sharp blue fluorescent band about 1 cm above the alumina zone when the developed column is examined under longwave ultraviolet light. Total analysis time is 15 min, and sensitivity of the method is in the range of 10-20 μg total aflatoxins (B_1 + B_2)/kg. An indication of the approximate contamination level can be obtained from the intensity of the fluorescent aflatoxin band. **AS**

2 S 231

[Biological determination of mycotoxins with the chick embryo test.] Biologischer Mykotoxin-Nachweis mit dem Hühnerembryotest.

Mintzlaff, H.-J.; Christ, W.

Fleischwirtschaft **52** (9) 1174-1176 (1972) [15 ref. De, en] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

Using a modified chick embryo test the toxic effect of the mycotoxins aflatoxin, tremortin, ochratoxin, citrinin, patulin, penicillic acid, gentisic acid and kojic acid as well as of filtrates and extracts from several mould species (Penicillium expansum, P. miczynskii, P. simplicissimum, P. cyclopium, P. viridicatum, P. janthinellum, P. palitans, P. citrinum and Scopulariopsis sp.) isolated from meats was demonstrated. The chick embryo test is recommended as a biological assay for mycotoxins, because it is sensitive, simple and quite rapid. However, so far no specific reactions for mycotoxins have been observed in the chick embryo test. Perhaps the specificity of this assay could be improved by using a special stain for demonstrating teratotoxic effects. **AS**

3 G 158

Modified ferric gel method for determining aflatoxin in cottonseed meals.

Velasco, J.

Journal of the Association of Official Analytical Chemists **55** (6) 1359-1360 (1972) [2 ref. En] [USDA, Beltsville, Maryland 20705, USA]

The ferric gel method for determining aflatoxin in cottonseed has been adapted for cottonseed meals. A change in solvent system and an additional purification step required by some meals have been incorporated into the method. Purification of these meals is accomplished by filtration rather than by chromatographic fractionation on columns of silica gel. The time of analysis as compared to the AOAC method is reduced by more than one half with this new method and total recoveries are comparable to or higher than those obtained with the AOAC method. Consideration should be given to cleanup of seed or plant extracts with ferric gel rather than with lead acetate not only because it removes plant pigments more effectively but also because it avoids the disposal of hazardous lead salts into water effluent systems. **AS**

3 J 396

Comparison of the observed distribution of aflatoxin in shelled peanuts to the negative binomial distribution.

Whitaker, T. B.; Dickens, J. W.; Monroe, R. J.; Wiser, E. H.

Journal of the American Oil Chemists' Society **49** (10) 590-593 (1972) [10 ref. En] [Market Quality Res. Div., Agric. Res. Service, Federal Center Building, Hyattsville, Maryland 20782, USA]

Suitability of the negative binomial distribution for use in estimating the probabilities associated with sampling lots of shelled peanuts for aflatoxin analysis has been studied. Large samples, called "minilots", were drawn from 29 lots of shelled peanuts contaminated with aflatoxin. These minilots were subdivided into ca. 12 lb samples which were analyzed for aflatoxin. The mean and variance of these aflatoxin determinations for each minilot were determined. The shape parameter k and the mean aflatoxin concentration m were estimated for each minilot. A regression analysis indicated the functional relationship between k and m to be: $k = (2.0866 + 2.3898m) \times 10^{-6}$. The observed distribution of sample concentrations from each of the 29 minilots was compared to the negative binomial distribution by means of the Kolmogorov-Smirnov test. The null hypothesis that each of the true unknown distribution functions was negative binomial was not rejected at the 5% significance level for all 29 comparisons. **AS**

3 J 481

Quantitative fluorodensitometric measurement of aflatoxin B_1 with a flying-spot densitometer. II. Comparative study of B_1 measurements in spiked and naturally contaminated peanut products.

Beljaars, P. R.; Fabry, F. H. M.; Pickott, M. M. A.; Peeters, M. J.

Journal of the Association of Official Analytical Chemists 55 (6) 1310-1315 (1972) [22 ref. En] [Food Inspection Service, Florynruwe 111, Maastricht, The Netherlands]

Peanut butter extracts and samples spiked with 5-40 μg aflatoxin B_1/kg and naturally contaminated peanut products were analysed by 3 extraction procedures: official Dutch method (KB), Liem et al. method (methanol) [FSTA (1971) 3 4J409], and IUPAC method (reference method). KB extracts were separated on silica gel G plates with a mixture of chloroform-acetone (90:10), IUPAC extracts were separated similarly on MN-G-HR plates. Methanol extracts were resolved on silica gel H plates, using chloroform-trichloro-ethylene-n-amyl alcohol-formic acid (80:15:4:1) as developing solvent. After development, plates were scanned with a reflectance flying-spot densitometer. With such techniques, average recoveries for spiked peanut butter extracts were 99-105%, with variation values of 11-12%. Recovery values of 69% (KB method) and 84% (methanol and IUPAC methods) were obtained for spiked peanut butter samples. Coeff. of variation were 13-15% for fluorodensitometric measurements. In naturally contaminated peanuts and peanut products, precision values were 13.6% for fluorodensitometric measurements compared to 36% for visual estimations. Both methanol and IUPAC methods yield extracts suitable for densitometric analysis after spotting on TLC plates; analytical results obtained are comparable. Extracts from the KB method contained more interfering fluorescent material than the other 2 methods. [See FSTA (1972) 4 12C303 for part I.] AS

3 N 136

Effect of storage conditions on increase in aflatoxins in cottonseed: A small lot study.

Whitten, M. E.

Journal of the American Oil Chemists' Society **49** (10) 596-597 (1972) [8 ref. En] [Market Quality Res. Div., Agric, Res. Service, Federal Center Building, Hyattsville, Maryland 20782, USA]

Small lots of cottonseed with low aflatoxin contamination were stored at 15, 18 and 22% moisture at 80 and 85°F. Maximum aflatoxin content was reached within 30 days' storage. The range in moisture content was sufficient to cause a 10-fold increase in aflatoxin content between seed stored at 15.1 and 21.8% moisture. Aeration caused about a five-fold mean increase in aflatoxin content. AS

3 P 310

[Occurrence of aflatoxin M_1 in dried milk products.]

Zum Vorkommen von Aflatoxin M_1 in Trockenmilchprodukten.

Neumann-Kleinpaul, A.; Terplan, G.

Archiv für Lebensmittelhygiene **23** (6) 128-132 (1972) [59 ref. De, en] [Tierärztliche Fak., Univ. 8 Munich 22, Veterinärstrasse 13, Federal Republic of Germany]

166 samples of commercially available dried milk products produced before appropriate regulations were introduced (including 22 spray-dried and 8 roller-dried whole milks; 38 spray-dried and 12 roller-dried skim-milk products; 56 milk-based dietetic and infant feeds; and 19 dried milk animal feeds) were examined for the presence of aflatoxin M_1 by extraction, column chromatography and TLC [See Official Methods of Analysis of AOAC, 11th Ed.]. Aflatoxin M_1 levels ranging from about 0.67 to about 2 μg/kg were found in 8 products. A feeding trial confirmed that approx. 1.39% of aflatoxin B_1 fed was excreted in milk as aflatoxin M_1. SAC

3 P 392

Experimental production of aflatoxin on brick cheese.

Shih, C. N.; Marth, E. H.

Journal of Milk and Food Technology **35** (10) 585-587 (1972) [14 ref. En] [Dept. of Food Sci., Univ. of Wisconsin, Madison, 53706, USA]

7-cm^3 pieces of 3-wk-old Brick cheese were sealed with wax on all surfaces except the tops, which was inoculated with spores of toxigenic strains of Aspergillus flavus or Asp. parasiticus. Samples were incubated at 7.2, 12.8 and 23.9°C in a humid chamber. 1, 2, 4 or 14 wk after mould growth became evident, samples were cut into 4 horizontal layers of approx. 1-cm thickness. Each layer was extracted, and aflatoxin was determined by TLC and fluorometry as described in FSTA (1969) 1 10C467. No aflatoxins were produced at 7.2°C. In samples inoculated with Asp. parasiticus, small amounts of aflatoxins B_1 and G_1 were detected in all layers at 1 wk at 12.8°C, and in the top 2 layers at 4 wk, but were not detected at 14 wk; at 23.9°C, B_1 and G_1 were detected in the top layer at 1 wk and in 3 layers at 4 wk, and B_1, B_2, G_1 and G_2 were detected in all layers at 14 wk. Brick cheese did not appear to be suitable for aflatoxin production by Asp. flavus, the only aflatoxins detected being small amounts of B_1, G_1 and G_2 in the top layer after 14 wk at 23.9°C. CDP

4 B 34

Microbiological standards for foods: prospects and perspectives. [Review]

Sulebele, G. A.

Indian Food Packer **26** (2) 45-61 (1972) [182 ref. En] [Dept. of Chem. Tech., Univ., Bombay-19, India]

Microbiological quality control programmes, methods employed, and problems of quality evaluation of processed foods are discussed. Among the topics reviewed are: usefulness and limitations in microbiological quality control of total bacterial count, direct microscopic count, yeast and mould count, and counts of spore-formers; coliforms and enterococci as indicators of faecal contamination; detection and enumeration of pathogens (Clostridium, Staphylococcus, Salmonella); and detection of fungal and bacterial toxins. **JA**

4 B 38

Fungal toxins.

Anon.

British Food Journal **75** (852) 18, 19, 21 (1973) [En]

The subject is discussed under the headings: Penicillia; Fusaria; Aspergilli; Pithomyces; other toxigenic fungi; Hazards to man. **JN**

4 C 81

[Stabilization of aqueous aflatoxin solutions for biochemical studies.] Stabilisierung wässriger Aflatoxin-Lösungen für biochemische Versuche.

Kiermeier, F.; Hemmerich, K.; Ruffer, L.

Zeitschrift für Lebensmittel-Untersuchung und Forschung **150** (3) 155-158 (1972) [5 ref. De, en] [Milchwissenschaftliches Inst., Weihenstephan, Federal Republic of Germany]

4 C 85

Mycotoxins (ochratoxin A, citrinin, and sterigmatocystin) and toxigenic fungi in grains and other agricultural products.

Scott, P. M.; Walbeek, W. van; Kennedy, B.; Anyeti, D.

Journal of Agricultural and Food Chemistry **20** (6) 1103-1109 (1972) [44 ref. En] [Food Res. Lab., Health Protection Branch, Dept. of Nat. Health and Welfare, Ottawa, Ontario K1A OL2, Canada]

Ochratoxin A was detected in 18 out of 29 samples of heated grain from Saskatchewan farms at concentrations of 0.03 to 27 ppm. After development of an appropriate screening method, 13 of these samples were also found to contain citrinin (0.07 to 80 ppm). Sterigmatocystin was detected in one grain sample. Strains of Penicillium viridicatum Westling or P. palitans Westling, producing either ochratoxin A or citrinin or (usually) both toxins concomitantly, were isolated from 22 grain samples (including 16 of those containing ochratoxin A), from three samples of mixed feeds (one of which contained ochratoxin A), from four samples of dried white beans (three containing ochratoxin A), and from an ochratoxin A positive sample of moldy peanuts. P. cyclopium Westling that produced penicillic acid was isolated quite frequently, particularly from mixed feeds, although the mycotoxin itself was not found in the samples. Zearalenone was identified in a culture of Fusarium equiseti (Corda) Sacc. isolated from a wheat sample. **AS**

4 C 86

Carcinogens produced by fungi. [Review]

Enomoto, M.; Saito, M.

Annual Review of Microbiology **26**, 279-312 (1972) [133 ref. En] [Dept. of Carcinogenesis & Cancer Susceptibility, Inst. of Med. Sci., Univ. of Tokyo, Japan]

In this review the problem of mycotoxin contamination of human foodstuffs is discussed. Detection of carcinogenic mycotoxins such as aflatoxins, sterigmatocystin, luteoskyrin, patulin, penicillic acid and griseofulvin is discussed. Field and storage surveys have revealed the actual existence of carcinogenic aflatoxins in staple foods and regular side dishes in such places as Uganda, Swaziland, the Transvaal of S. Africa, Japan, the Philippines, Thailand, the Inhambane area of Mozambique and New Guinea. Results of field investigations on isolation of toxic fungi from foods showed that most of the fungal species belonged to the 2 major genera of the storage fungi, Aspergillus and Penicillium. The foods included: rice grains (unhulled, rough and polished rice); other cereal grains (wheat, barley etc.); rice and wheat flour; soybeans; red beans and other legumes; fermented foods such as miso (soybean paste), shoyu (soy sauce), moromi (mash), tsukemono (Japanese pickles), and nukamiso (pickled vegetables in a mixture of rice bran, salt and water); dried fish; and edible seaweeds. Exploration of new carcinogenic mycotoxins is covered, including discussion of methods of screening carcinogens, cancer induction in humans by ingested mycotoxins and chronic toxicity and carcinogenic effect. **AA**

4 C 97

[A short communication on aflatoxin analysis.] Ein kurzer Beitrag zur Aflatoxin-Analytik.

Ranfft, K.

Zeitschrift für Lebensmittel-Untersuchung und Forschung **150** (3) 130-133 (1972) [11 ref. De, en] [Bayer. Hauptversuchsanstalt für Landwirtschaft, D-8050 Freising-Weihenstephan, Federal Republic of Germany]

Substances whose fluorescence interferes with the determination of aflatoxin can be removed almost completely by dry-column chromatography on silica gel of a 70% acetone extract of the aflatoxin-containing material from which various contaminants have been previously removed as usual by treatment with lead acetate and column chromatography. The dry-column chromatogram is developed by chloroform/acetone/n-hexane or ethanol/ammonia, and the aflatoxin band located by rapid UV illumination, removed and further treated by TLC. Recovery of aflatoxin, added to various materials, was almost quantitative. **GTP**

4 G 193

[Position and achievements of research in agricultural chemistry and agricultural biology. XXI.] Stand und Leistung agrikulturchemischer und agrarbiologischer Forschung. XXI.

Federal Republic of Germany, Verband Deutscher Landwirtschaftlicher Untersuchungs- und Forschungsanstalten

Landwirtschaftliche Forschung **26** (II), Sonderheft 220pp. (1971) [many ref. De]

This issue is devoted to the 1970 annual conference of the Association of German Agricultural Analytical and Research Stations, and includes the following articles: Relations between fertilization and processing characteristics of potatoes, with particular reference to content of reducing sugars, by H. W. Stricker (pp. 11-20, 2 ref.); Requirements regarding quality and composition of potatoes for processing, by G. Adler & M. Schilling (pp. 25-27); Sp. gr. and analytical composition of potatoes, by W. Kempf & H. Schnegg (pp. 28-36, 4 ref.); Use of propionic acid for preservation of oats and maize, and its mechanism, by S. B. Singh-Verma (pp. 71-86, 19 ref., De, en); Aflatoxin content of peanut waste, by H. Dietrich & H. Kummer (pp. 125-129, 4 ref.); and Microscopic classification of dried whey, by W. Huss (pp. 141-147, 6 ref.). **HBr**

4 J 613

[Aflatoxins in groundnuts in Senegal.] [Review]

Goarin, P.; Goarin, S.

Agronomie Tropicale **25** (3) 277-293 (1970) [48 ref. Fr, en, es]

The subjects is reviewed under the following headings: level of aflatoxins in groundnut products from Senegal (groundnuts, press cake, groundnuts for flour production); causes of and conditions influencing the presence of aflatoxins in Senegalese groundnuts; agricultural methods of control; technological methods of control; toxicity of groundnuts from moderately infected areas; and methods of studying aflatoxins. **JA**

4 M 376

[Moulds in the baking industry. II.]

Ticha, J.

Mlynsko-Pekarensky Prumysl **18** (7) 220-221 (1972) [14 ref. Cs] [Vyzkumny Ustav Mlynsko-pekarenskeho Prumyslu, Prague, Czechoslovakia]

Various mycotoxins and the diseases caused by them are discussed. Their chemical structure is described and new methods by means of which individual mycotoxins are isolated from substrates and estimated qualitatively and quantitatively are covered. Substrates which are particularly favourable for ochratoxin formation are oats, rye and wheat bread. It is necessary to assess which types of mould found on cereals are potentially toxic. **STI**

4 P 529

[Detection of aflatoxin M in milk.] Über den Nachweis von Aflatoxin M in Milch.

Kiermeier, F.; Mücke, W.

Zeitschrift für Lebensmittel-Untersuchung und Forschung **150** (3) 137-140 (1972) [13 ref. De, en] [Milchwissenschaftliches Inst., D-8050, Weihenstephan, Federal Republic of Germany]

4 S 393

Occurrence of aflatoxinogenic moulds on "dry Cracower sausage".

Strzelecki, E. L.; Badura, L.

Acta Microbiologica Polonica, B **4** (4) 233-239 (1972) [10 ref. En, pl] [Inst. of Marine Med., Gdansk, Poland]

The aim of this work was to isolate moulds from samples of 'dry Cracower sausage' obtained from 10 different meat plants in Poland, and to test the moulds isolated for their toxigenicity. 14 spp. of moulds belonging to the following 9 genera were isolated: Alternaria, Aspergillus, Botrytis, Cladosporium, Mucor, Penicillium, Scopulariopsis, one unidentified and one species of the genus Streptomyces. Of the 36 strains isolated, only 4 strains of Aspergillus flavus were found to be toxigenic. The amount of aflatoxin (B + G) produced by these strains when grown on a medium containing 20% sucrose and 2% yeast extract ranged from 2.3 to 3.1 mg/100 ml medium. No toxins were detected in any of the sausage samples examined. **AA**

4 T 197

Some aspects of the toxicology of food. [Lecture]

Gangolli, S. D.

Journal of the Association of Public Analysts **10** (3) 74-86 (1972) [14 ref. En] [Biol. Chem. Dept., British Ind. Biol. Res. Assoc., Carshalton, Surrey, UK]

Safety evaluation studies and toxicological research on food additives and other environmental chemicals, are discussed and the stages at which chemicals enter food are considered. In the course of food production, nutrients, growth promotors, seed dressings and various agricultural chemicals are introduced. In addition, the foods are subjected to fumigation and pesticide treatment to prevent deterioration in storage. In the next stage of food processing, in addition to direct food additives a number of substances such as lubricants used in machinery, and mould-releasing agents inadvertently enter into the finished product. The packaging of food is also likely to lead to the migration of trace amounts of chemicals from the surface of containers into the food. These contaminants include fillers used in paper and board, plasticizers, and antistatic agents in plastics and lacquers from metal cans. Also, many toxic substances occur naturally in food. They include the thioglycosides goitrogens, oestrogens and mycotoxins. Considerations to be taken into account in conducting safety evaluation studies are discussed including: metabolism and toxicology of compounds; role of human gut flora; accumulation of compounds in the body; and interactions of food additives with other constituents present in the food. **AA**

5 C 106
Qualitative testing for aflatoxins.
Knake, R. P.; Rao, C. S.; Deyor, C. W.
Milling **155** (2) 24, 26 (1973) [5 ref. En]

A method for the detection of aflatoxin from Aspergillus flavus is described, which is economical, detects aflatoxin at levels of 10-15 parts per 1000 million, and requires 5-15 min per sample. The method consists of a basic procedure plus modifications which may be used for special products e.g. certain grain fractions (white maize and oats) which in some cases are difficult to separate from the extracting solvent, and products with a high fat content or a large amount of fat soluble pigments. The test is not quantitative due to incomplete extraction and separation. It appears, however, to be a fast way to determine whether or not aflatoxins are present in products to be used in food or feed. **AA**

5 C 108
[Thin layer chromatographic study of aflatoxins. Importance of distinguishing from other fluorescent spots.]
Jacquet, J.; Boutibonnes, P.; Teherani, A.
Bulletin de l'Academie Veterinaire de France **44** (6) 263-275 (1971) [15 ref. Fr] [Lab. de Microbiol., Univ., Caen, France]

Fluorescent spots in thin-layer chromatograms of various vegetable matters, especially if moulded, and of various cheeses can be distinguished from those due to aflatoxins by the positions they occupy in chromatograms developed by the 5 solvents, ether, chloroform/methanol (95:5), chloroform/acetone (90:10), methanol/water (60:40) and benzene/ethanol/water (46:35:19). Chromatograms illustrating the value of this procedure are presented. The indications furnished may be supplemented by simple biochemical tests, examination of the UV spectra of the spot-forming substances, or, less specifically, by biological tests. Aflatoxins are readily destroyed by exposure to light and should be protected from it as far as possible. **CTP**

5 C 111
Induction of hepatic carcinoma with aflatoxin in the rhesus monkey.
Gopalan, C.; Tulpule, P. G.; Krishnamurthi, D.
Food and Cosmetics Toxicology **10** (4) 519-521 (1972) [9 ref. En, fr, de] [Nat. Inst. of Nutr., Indian Council of Med. Res., Hyderabad-7]

The carcinogenic effect of aflatoxin has been investigated in the rhesus monkey. The toxin was administered to 1 male and 1 female monkey in a sub-acute dose for a period of 5.5 yr. In the male animal, a rapidly growing hepatocellular carcinoma of a giant-cell type developed 2.5 yr after the toxin administration had been discontinued. The histopathology of the tomour is described. Observation of the female is continuing. **AS**

5 C 112
Aflatoxin residues in food of animal origin.
[Review]
Purchase, I. F. H.
Food and Cosmetics Toxicology **10** (4) 531-544 (1972) [61 ref. En] [Nat. Res. Inst. for Nutr. Diseases, South African Med. Res. Council, Private Bag 380, Pretoria]

The following aspects are considered: aflatoxin M (biological and chemical properties, assay methods, presence in milk); aflatoxin in animal products other than milk (pork, beef, poultry, eggs, stored meats); other aflatoxin metabolites; significance of studies on aflatoxin residues; and control measures. **VJG**

5 C 113
Aflatoxin metabolism in duck-liver homogenates: the relative importance of reversible cyclopentenone reduction and hemiacetal formation.
Patterson, D. S. P.; Roberts, B. A.
Food and Cosmetics Toxicology **10** (4) 501-512 (1972) [11 ref. En, fr, de] [Central Vet. Lab., Min. of Agric., Fisheries Ç5 Food, New Haw, Weybridge, Surrey, UK]

5 C 114
[Occurrence of aflatoxins in mould-free foods and proposals for sampling.] Über das Vorkommen von Aflatoxinen bei unverschimmelten Lebensmitteln und Vorschäge für die Probenahme.
Hanssen, E.; Jung, M.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **150** (3) 141-145 (1972) [20 ref. De, en] [Lab. der H. Bahlsens Keksfabrik KG, Hannover, Federal Republic of Germany]

Aflatoxins may occasionally occur in raw materials or foods even if macroscopic or microscopic examinations do not reveal the presence of mould mycelium or spores. Thus mould-free samples of ham and marzipan have been found which contained 100 and 1.3 μg aflatoxin/kg respectively, and dried milk containing 1 μg/kg. Sources would appear to include aflatoxin-forming moulds introduced via animal fodder or by faulty manufacturing techniques or by flies and insects. Aflatoxins formed in areas thus contaminated could diffuse into uncontaminated parts and survive subsequent removal of mould by cleansing operations. Sampling procedures are proposed which are capable, to a high degree of probability, of allowing the detection of aflatoxins in materials in which they may be unevenly distributed. **GTP**

5 H 767

[Study of environmental factors that affect aflatoxin production in foods. I.]

Lucisano, A.; Campanini, M.; Casolari, A.

Industria Conserve **47** (1) 27-31 (1972) [14 ref. It, en, fr, de] [Sta. Sperimentale per l'Ind. delle Conserve Alimentari, Parma, Italy]

Unsterilized and sterilized samples of tomato juice were inoculated with Aspergillus flavus (10^3 spores/ml) and incubated at 28°C, either in the dark or with illumination. The juices were examined for physico-chemical characteristics after 11 and 25 days of incubation and compared with fresh juice; amounts of aflatoxin were determined after 2, 4, 6, 8, 11, 14, 17 and 25 days of incubation. Results show that incubation in the dark generally increases the amount of aflatoxin produced and the amount produced is less in unsterilized samples e.g. after 25 days the amounts (in µg/g) were: sterilized: dark 1.0, light 0.5; unsterilized: dark 0.1, light 0.2. For the sterilized samples production reaches a peak at 11 days and thereafter decreases; for the unsterilized samples production gradually increases over the 25 days. With increasing storage time, reducing sugar, NaCl and residual sugar contents and acidity decrease and pH increases. Changes in the bacteria and yeast populations of unsterilized juice during storage are reported. **LA**

5 M 498

[Cereal chemists' conference of the study group for cereal research held in Detmold on 20-33 June 1972.] Getreidechemiker-Tagung der Arbeitsgemeinschaft Getreideforschung e.V. in Detmold vom 20. bis 22. Juni 1972.

Federal Republic of Germany, Arbeitsgemeinschaft Getreideforschung eV

Mühle **109** (29) 451-453; (32) 500-503; (41) 656 (1972) [De]

The following papers presented at the conference are summarized: Structure, functions and properties of wheat flour carbohydrates, by H. Neukom; Influence of water-insoluble wheat and rye pentosans on baking properties of wheat flour and other raw materials, by J. P. Casier, G. de Paepe & J.-M. Brümmer; Nature of swelling substances as index of processing value of bread rye, by E. Drews; Use of non-wheat flours in baking, by D. de Ruiter; Ascorbic acid in production of wheat bread, by B. H. Thewlis; Sampling from bags and piles of cereals for pesticide residue determination, by H. Semig; New regulations for pesticide residues - effects on cereal sector, by W. Hertel; Swelling substances and their effects on baking, by W. Schäfer; Rheology of rye doughs, by D. Weipert; Use of α-amylases in baking, especially bacterial α-amylase, by A. Schulz & H. Uhlig; Analytical problems in detection of mycotoxins, by H. Bösenberg; Methods of determining starch enzymolysis with reference to bread, by E. Drews; Analysis of CCC residues in wheat, by W. Nierle; Determination of raising power of yeast - national and international recommendations, by A. Schulz; Determination of residues in the mill laboratory, by G. Plasch; Comminution produced by different laboratory mills and effects on analyses, by K. Vorwerck; Report on wheat tin-baking test in relation to Rapid Mix Test, by A. Schulz; Preliminary work on standardizing starch determination, by F. Meuser & B. Thomas; and Determination of starch damage in milled wheat products, by B. Belderok. **RM**

5 M 657

[Changes in aflatoxin B_1 during breadmaking.]

Jemmali, M.; Lafont, P.

Cahiers de Nutrition et de Dietetique **7** (4) 319-322 (1972) [11 ref. Fr] [Service des Mycotoxines de la Sta. de Biochemie et Physico-Chimie des Cereales de l'INRA, 16, rue Nicolas-Fortin, 75013 Paris, France]

Wheat (Etoile de Choisy) flour was artificially contaminated with aflatoxin B_1 at levels of 225, 200 or 100 µg/kg, or mixed with aflatoxin-containing peanut meal to give levels of 190, 150, 50 or 40 µg of aflatoxin/kg of flour. The contaminated flours were used to make bread, and aflatoxin was measured at different stages of the process. A marked decrease (25-87%) in aflatoxin was observed after kneading. The results varied from batch to batch, but it is thought that the decrease were due to oxidation and/or hydrolysis of the aflatoxin. Further losses occurred during the rising of the dough and during baking, but the final product contained significant amounts of the mycotoxin e.g. bread made with flour containing 200 µg of aflatoxin/kg contained 44 µg of aflatoxin/kg. The necessity for avoiding contamination of wheat with Aspergillus flavurs is stressed. **MEG**

5 P 689

[Hygienic significance of fungi in foods.]

Jantea, F.; Oprisescu, D.; Stancescu, B.; Molnar, A.; Sepeteanu, A.

Igiena **21** (8) 495-504 (1972) [17 ref. Ro] [Catedra de Igiena Alimentatiei, I. M. F., Bucharest, Rumania]

The dangers of fungi are reviewed, including a systematic table of the various toxic effects of many fungi. 109 samples of cheeses taken at the point of sale were examined by incubation at 22-24°C for 3-5 days. Pickled Telemea cheese (25 samples) contained 45 fungi/g; Burduf-type cheese, a kneaded, soft curd cheese (10 samples), 1370/g; Kachkaval cheese (29), 408/g; semi-hard cheese (30), 826/g; Svaiter cheese, a hard cheese (7), 334/g; and processed cheese (8), 650/g. Most of the fungi isolated from the interior of the cheeses were Penicillium or Aspergillus spp. Cheese is considered to be the most dangerous of the animal foods as far as fungal toxins are concerned. **JMD**

6 C 147
[Mycotoxins in foods. VI. Aflatoxin formation by different moulds.] Mykotoxine in Lebensmitteln. VI. Aflatoxinbildung verschiedener Pilzarten.
Rehm, H.-J.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **150** (3) 146-151 (1972) [11 ref. De, en] [Inst. für Mikrobiol. der Univ. Münster, German Federal Republic]

74 mould cultures, including a wide range of spp. and strains, were examined for ability to produce aflatoxins when cultivated in a synthetic medium (with saccharose) and in the synthetic medium with additions of wheat starch or rice. Normal chromatographic methods of examination were used. 5 strains of Asp. flavus produced aflatoxins (in all 3 media) but none of the other cultures were able to do so and reports of widespread occurrence of aflatoxin production by various classes of moulds could not be confirmed. Some moulds produced substances which could be mistaken for aflatoxin during analysis, leading to false positive results. [See FSTA (1972) 4 3C74 for part V.] ELC

6 C 148
[Doubts about aflatoxin formation by Penicillium.] Zweifel über das Vorkommen von Aflatoxin bei der Gattung Penicillium.
Frank, H. K.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **150** (3) 151-153 (1972) [13 ref. De, en] [Bundesforschungsanstalt für Lebensmittelfrischhaltung, Karlsruhe, Federal Republic of Germany]

218 cultures of Penicillium, representing 41 spp., were examined for ability to produce aflatoxins. None did so, but 14 strains produced metabolites having a fluorescence pattern which might be mistaken for aflatoxin in TLC. 31 strains produced an antibiotic active against Bacillus subtilis. ELC

6 C 149
[Production of aflatoxin-like substances by Penicillium species.] Bildung Aflatoxin-ähnlicher Substanzen durch Penicillum-Arten.
Bösenberg, H.; Becker, E.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **150** (3) 153-154 (1972) [3 ref. De, en] [Hygiene-Inst. der Univ. Münster, Federal Republic of Germany]

60 cultures of Penicillium moulds grown in a semolina culture medium produced 23 instances of fluorescing substances resembling the chromatographic appearance of aflatoxin. These 'false' substances could be excluded with certainty by using UV absorption for examination of the chromatogram. ELC

6 C 167
[Contaminants of fungal origin in foods.]
Nicolet, J.
Euroviande - Courrier des Abattoirs **14** (75) 23-27 (1973) [6 ref. Fr] [Ecole Veterinaire, 3000 Berne, Switzerland]

Particular reference is made to mycotoxins, and a description is given of their chemical structure, mode of action and toxicity. Detection and prevention of their presence in foods are also covered. HBr

6 G 314
[Conference of the Northern Working Group of the German Chemists' Society's Food Chemistry and Judicial Chemistry Specialist Group.] Sitzung des Arbeitskreises Nord der GDCh-Fachgruppe "Lebensmittelchemie und Gerichtliche Chemie".
Federal Republic of Germany. Gesellschaft Deutscher Chemiker
Mitteilungsblatt der GDCh-Fachgruppe Lebensmittelchemie und Gerichtliche Chemie **24** (10) 205-213 (1970) [De]

Resumes are given of papers read at the Conference, held on 6 March 1970 in Brunswick, and include: Significance of mycotoxins in foods, by H. J. Rehm; Some mutual effects of product and can material in canned fruit and vegetables, by P. Nehring; East Asian beverages are coming to Europe, by C. Wilhelm; Occurrence of mannite in wine, by G. Lippke; New potential antioxidants and their evaluation, by W. Untze; and Determination of the biological value of food protein, by F. Jekat (23 ref.). HBr

6 M 755
[Aflatoxin production by strains of Aspergillus flavus from corn.]
Zenteno Zevada, M.
Revista Latinoamericana de Microbiologia **13** (4) 263-266 (1971) [17 ref. Es, en] [Inst. de Biol., UNAM, Mexico]

Asp. flavus was obtained from corn grains at two locations. The fungus was grown in 5 different culture media, in stationary culture at 25°C. Aflatoxin extraction was by aqueous acetone, and determination of aflatoxins by TLC analysis on silica gel. All isolates tested produced aflatoxins in some degree, primarily aflatoxin B_1. AS

6 P 785
[Possibility of B_1 aflatoxin formation in twarog.]
Burzynska, H.
Roczniki Panstwowego Zakladu Higieny **23** (6) 645-648 (1972) [5 ref. Pl] [Panstwowy Zaklad Higieny, Warsaw, Poland]

150-g samples of twarog prepared in the laboratory from tyndallized milk (i.e. steamed for a period of time on 3 successive days) were inoculated with Aspergillus flavus at approx. 500 conidia/g and examined after 3, 6, 9 or 12 days of incubation at 25°C, or inoculated with 100-100 000 conidia/g and examined after 10 days of incubation at 18-20°C or 25°C. Aflatoxin was measured by the method of Parker & Melnick [Journal of the Americal Oil Chemists' Society (1966) **43**, 635]. Asp. flavus multiplied more vigorously during incubation at 18-20°C than at 25°C but generally formed more aflatoxin at the higher temp. (upto 0.6 µg/g twarog vs. up to 0.2 µg/g). Size of initial inoculum had no definite effect on aflatoxin production. SKK

7 C 185
[Food poisoning classification.]
Petrovskii, K. S.
Gigiena i Sanitariya No. 3, 91-95 (1973) [Ru] [I Moskowskii Med. Inst. imeni I. M. Sechenova, Moscow, USSR]

(i) the food infection and poisoning classification scheme proposed by F. E. Budagyan at the All-Union Food Poisoning conference in Erevan in 1969 and (ii) a scheme of food poisoning classification put forward by the author are presented. The main divisions of (i) classification are: food (intestinal) infections [major infectious diseases]: food subinfections (toxicoinfections) [pathogenic coliforms, Proteus, Clostridium perfringens type A, Bacillus cereus, enterococci]; food poisoning of microbial origin; food poisoning of non-microbial origin; and food infection and poisoning of unestablished aetiology. The main divisions of (ii) are: food poisoning of bacterial origin; food poisoning of fungal origin (mycotoxicoses); and food poisoning of non-microbial origin (subdivided into chronic and acute types). SKK

7 T 334
Accumulation of only aflatoxin B_2 by a strain of Aspergillus flavus.
Schroeder, H. W.; Carlton, W. W.
Applied Microbiology 25 (1) 146-148 (1973) [1 ref. En] [Agric. Res. Service, USDA, College Station, Texas 77840, USA]

A strain of Asp. flavus isolated from ground black pepper produced only aflatoxin B_2 on several natural substrates. AS

8 C 251
Evaluation of florisil tubes in detection of aflatoxin.
Velasco, J.; Whitten, M. E.
Journal of the American Oil Chemists' Society 50 (4) 120-121 (1973) [1 ref. En] [Agric. Marketing Res. Inst., USDA, Beltsville, Maryland 20705, USA]

A study was made to determine the reliability and sensitivity of detecting aflatoxin in florisil tubes. 6 panelists examined 40 samples with 222 responses recorded. At levels of 5 parts/billion and higher, panel members were able to detect aflatoxin with an accuracy of >99%. At levels >10 parts/billion, accuracy was 100%. AS

8 J 1176
International Aflatoxin Check Sample Program: 1972 study.
Coon, F. B.; Baur, F. J.; Symmes, L. R. L.
Journal of the Association of Official Analytical Chemists 56 (2) 322-327 (1973) [En] [WARF Inst. Inc., 506 N. Walnut St., Madison, Wisconsin 53701, USA]

In the second International Aflatoxin Check Sample Series, a single sample, peanut butter, was submitted to 152 laboratories throughout the world. Sufficient data were obtained from 117 responding laboratories to permit a statistical comparison of the BF, CB, and Pons methods. No significant differences in mean values were obtained. One quarter of the participating laboratories were from countries other than Canada and the United States. [See FSTA (1972) 4 8J1416 for 1971 study.] AS

8 P 1115
[Aflatoxins and their properties - milk and milk products.]
Jacquet, J.
Technique Laitiere No. 775, 27-29 (1973) [Fr] [Lab. de Microbiol. UER des Sci. de la Vie et du Comportement, Univ. de Caen, France]

Following a general discussion on aflatoxins (historical aspects, composition and chemical properties, production from moulds, geographical distribution, biological effects, methods of detection and quantitation), the author outlines the products in which aflatoxins are most frequently found, mentioning particularly their incidence and levels in milk and milk products; the need for better analysis of aflatoxins is stressed. DMK

9 A 413
[Determinations of aflatoxins in the light of Polish regulations.] [Review]
Falkowski, J.; Siwicka, H.; Warzecha, A.
Przemysl Spozywczy 27 (4) 163-166 (1973) [33 ref. Pl, ru, en, fr, de]

9 C 255
[Problems of aflatoxin determination.] Zur Problematik der Aflatoxinbestimmung.
Fritz, W.; Engst, R.; Donath, R.
Nahrung 16 (6) 681-687 (1972) [19 ref. De, en, ru] [Zentralinst. für Ernährung Potsdam-Rehbrücke der Akad. der Wissenschaften, German Democratic Republic]

A method for quantitative detn. of aflatoxins in food is described. 100-g samples are homogenized with 150 ml saturated NaCl solution + 200 ml chloroform, and centrifuged; the cloroform phase is then separated, and the residue extracted twice again with chloroform. The cloroform extracts are then combined, dried over Na_2SO_4, filtered and evaporated to dryness. Interfering fats are removed by extraction with cyclohexane and nitromethane. The extract is then purified by column chromatography on alumina, and analysed by TLC on kieselgel PF_{254} or G, using ether/methanol/water (94:5:1). Aflatoxin spots are identified by UV fluorescence, or extracted with chloroform, evaporated to dryness, dissolved in 3 ml ethanol and determined by UV spectrophotometry (for concn. >1 μg/ml) or fluorescence spectroscopy (for concn. <1 μg/ml, detection limit 0.5 μg/ml) IN

9 C 258

[Production of aflatoxin M standards for analytical investigations.] Zur Herstellung von Aflatoxin M-Standards für analytische Untersuchungen.

Mücke, W.; Kiermeier, F.

Zeitschrift für Lebensmittel-Untersuchung und -Forschung **151** (6) 387-391 (1973) [16 ref. De, en] [Milchwissenschaftliches Inst. der Tech. Univ. München, Freising-Weihenstephan, Federal Republic of Germany]

9 J 1479

Aflatoxin production in peanut varieties by Aspergillus flavus Link and Aspergillus parasiticus Speare.

Nagarajan, V.; Bhat, R. V.

Applied Microbiology **25** (2) 319-321 (1973) [13 ref. En] [Nat. Inst. of Nutr., Indian Council of Med. Res., Jamai-Osmania, Hyderabad-7]

Levels of aflatoxin produced in groundnuts differed with the genetic variety of plant and with the species and strain of invading fungus. Possibilities for identifying groundnut varieties partially resistant to aflatoxin production are discussed. **AS**

9 J 1480

The presence of aflatoxin in kernels from five years groundnut crops and of Aspergillus flavus isolates from kernels and soils.

Joffe, A. Z.

Plant and Soil **33** (1) 91-96 (1970) [11 ref. En] [Dept. of Botany, Hebrew Univ., Jerusalem, Israel]

Toxicity tests were conducted on 186 samples of fresh groundnut kernels and 419 samples of kernels stored for 2-8 months. Only 0-6.4% of fresh kernels were toxic (max. aflatoxin content 57 ppb); 0-32% of the stored kernels were toxic (max. aflatoxin content 125 ppb). Toxicity tests carried out on 1626 Aspergillus flavus isolates from soil and groundnut kernels showed that the % toxigenic strains from fresh and stored kernels were 84.6-100% and 78.2-97.7% respectively. In quantitative tests with 750 isolates, 60% produced aflatoxin in concn. >25 000 ppb. [See also FSTA (1969) **1** 5C216.] **PG**

10 C 287

[Public health aspects of aflatoxin-contamination of foods.] Aspekte der Aflatoxinkontamination von Lebensmitteln als Aufgabe des vorbeugenden Gesundheitsschutzes.

Krug, G.; Kusche, P.

Zeitschrift für die Gesamte Hygiene und ihre Grenzgebiete **19** (5) 342-348 (1973) [17 ref. De. ru] [Hygiene-Inst. des Magistrats, Berlin (GDR)]

A TLC method for routine semi-quantitative determination of aflatoxin B_1 in foods is described. The aflatoxin is extracted from defatted food samples with chloroform-methanol-water, and separated by TLC using a chloroform-methanol solvent mixture. Interfering substances are separated by developing with ether. The aflatoxin spots may be detected by fluorescence at 360 nm, and quantitatively determined by UV fluorescence spectrometry. Import control surveys in 1970 and 1971 showed that 10% of groundnut kernels imported into the German Democratic Republic were aflatoxin-contaminated; supervision of the trade in groundnut kernels is briefly discussed. **IN**

10 N 553

Occurrence of aflatoxins in cotton seeds at harvest in relation to location of growth and field temperatures.

Marsh, P. B.; Simpson, M. E.; Craig, G. O.; Donoso, J.; Ramey, H. H., Jr.

Journal of Environmental Quality **2** (2) 276-281 (1973) [28 ref. En] [Plant Sci. Res. Div., USDA, Beltsville, Maryland 20705, USA]

Cottonseeds (Gossypium hirsutum L.) from 13 locations across the US Cotton Belt in 1969 and 11 locations in 1970 were analysed for aflatoxins. Samples from most locations did not exhibit detectable aflatoxin contamination. However, aflatoxins B_1 and B_2 were found in one or more samples collected near Brawley, California; Phoenix, Arizona; and Weslaco, Texas, all in areas where a boll rot caused by Aspergillus flavus Link has been noted repeatedly since the crop of 1953. Aflatoxins occurred especially in seeds whose fibre exhibited a bright greenish yellow (BGY) fluorescence which is diagnostic for this boll rot. When seeds from the 1970 crop were examined for internal fungal infection, Asp. flavus was detected only in the seeds from Brawley. Free fatty acids were high in seeds from several areas, both with and without accompanying aflatoxins. Weather records indicated that Asp. flavus boll rot occurs mainly, perhaps exclusively, in conjunction with exceptionally high field temp. **AS**

10 P 1463

[Second Franco-German colloquium on milk and milk products, held at Vittel during 4-6 June 1973.]

Anon.

Technique Laitiere No. 784, 15, 18-21, 23 (1973) [Fr]

Brief accounts are given of the following papers presented at the colloquium: Content of pesticides in milk, by Franck (p. 15); Content of pesticides in French butter, by J. Casalis & Luquet (p. 18); Aflatoxins in milk, by F. Kiermeier (p. 18); Aflatoxins in dried dairy products, by Hansen & Jung (pp. 18-19); Physical state of fat in relation to the characteristics of cheese, by Keilling (p. 19); Aeromonas and indologenous bacteria in packaged pasteurized milk, by Veillet (pp. 19-20); Coliforms in soft cheeses, by Jacquet (p. 20); Methods for the determination of copper in dairy products, by Alais & Linden (p. 21); Use of sorbic acid for the preservation of cheese, by Lück (p. 21); and Caseinates in the food industry: uses and analyses, by Alais & Guerin (pp. 21-23). **FL**

10 P 1488

Effects of ammoniation on aflatoxins in rations fed lactating cows.

McKinney, J. D.; Cavanagh, G. C.; Bell, J. T.; Hoversland, A. S.; Nelson, D. M.; Pearson, J.; Selkirk, R. J.

Journal of the American Oil Chemists' Society **50** (3) 79-84 (1973) [20 ref. En] [California St. Univ., Fresno, 93710, USA]

Measurements were made of the aflatoxin M_1 content of milk samples from cows receiving rations containing aflatoxin-contaminated cotton seed meal (CSM) or ammoniated aflatoxin-contaminated CSM. None of the milk samples from cows fed ammoniated rations contained aflatoxin M_1. The level of aflatoxin M_1 in milk from cows receiving a total of 1200 µg aflatoxin B_1/day in the CSM diet increased from 1.1 µg/l. after 24 h to a max. of 1.7 µg/l. on the 3rd day of feeding. The level of aflatoxin M_1 in the milk was proportional to the level of aflatoxin B_1 ingested but was not correlated with milk yield. Conversion of ingested aflatoxin B_1 to aflatoxin M_1 in the milk varied from 0.43-1.38%. Within 72 h of withdrawal of the contaminated diet, aflatoxin M_1 could not be detected in the milk. Aflatoxin M_1 disappeared rapidly from raw milk on storage at 32°F; after 6 days, only 20% of the original activity was present. Aflatoxin M_1 activity decreased more slowly in frozen raw milk, but in samples of frozen curds and whey (obtained by rennet precipitation) it was stable over a period of 4 months; 80% of the aflatoxin M_1 activity was associated with the curd. The data obtained from the feeding trials indicated that ammoniation is a technically feasible method for eliminating aflatoxin from contaminated cotton seed. **MEG**

10 P 1532

[Determination of aflatoxin M_1 and M_2 in milk.]

Bestimmung von Aflatoxin M_1 und M_2 in Milch.

Kiermeier, F.; Mücke, W.

Zeitschrift für Lebensmittel-Untersuchung und -Forschung **152** (1) 18-24 (1973) [22 ref. De, en] [Milchwissenschaftliches Inst. Weihenstephan, Federal Republic of Germany]

A rapid and accurate method of determing aflatoxins M_1 and M_2 in milk, described in detail, employs 2-dimensional TLC on silica gel of a chloroform extract of the milk from which the fat has been previously removed and the protein precipitated by cadmium sulphate but not removed. The chromatogram is developed with ethyl ether and ethyl acetate/acetonitrile (1:1) and examined under UV illumination. Identification of the aflatoxins is confirmed by formation of derivatives and use of spray reagents; approximate estimation of each is made by visual comparison of its fluorescence with that of a corresponding aflatoxin M_1 or M_2 standard. **GTP**

11 C 294

Aflatoxin production of species and strains of the Aspergillus flavus group isolated from field crops.

Schroeder, H. W.; Boller, R. A.

Applied Microbiology **25** (6) 885-889 (1973) [11 ref. En] [Market Quality Res. Group, USDA, College Station, Texas 77840, USA]

Peanuts, cottonseed, rice, and sorghum from Texas were sampled over a 3-yr period. To ensure adequate isolation of aflatoxin-producing species of fungi, low-quality lots were sampled at a rate greater than their respective proportional representation. Aflatoxins were found each yr in peanut and cottonseed and were found in 2 of 3 yr in rice and sorghum. Aflatoxins were detected in all 4 crops. The Asp. flavus group was much more prevalent in peanut and rice than in cottonseed and sorghum. Of the isolates of the Asp. flavus group, 96% from peanuts, 79% from cottonseed, 49% from sorghum, and 35% from rice produced aflatoxins. The average toxin production of isolates from rice was much less than that from peanuts, cottonseed, or sorghum. 90% of all isolates of the Asp. flavus group were identified as the species Asp. flavus. Asp. parasiticus was isolated from all 4 crops. Only Asp. parasiticus produced aflatoxin G. **AS**

11 C 307

Rapid detection of aflatoxin contamination in agricultural products.

Pons, W. A., Jr.; Cucullu, A. F.; Franz, A. O., Jr.; Lee, L. S.; Goldblatt, L. A.

Journal of the Association of Official Analytical Chemists **56** (4) 803-807 (1973) [6 ref. En] [Southern Regional Res. Lab., USDA, New Orleans, Louisianna 70179, USA]

A rapid and simple method, originally designed for detecting aflatoxin contamination in cottonseed products within 15 min, was modified for application to a variety of agricultural products. The modified method involves rapid blender extraction of the sample with aqueous acetonitrile, treatment of an aliquot of the filtrate with lead acetate solution to remove interfering pigments, and rapid partition of aflatoxins in the treated extract into benzene to effect an 8-fold concentration of the aflatoxins. A portion of the benzene extract is adsorbed by capillary attraction onto the bottom of a small column (4 mm × 20 cm) filled with zones of acidic alumina and silica gel and the column is allowed to develop 5 min in chloroform-acetonitrile-2-propanol (93+5+2). Aflatoxin contamination is characterized by a sharp blue fluorescent band about 1 cm above the alumina zone when the developed column is viewed under longwave UV light. The total analysis time is about 20 min. The method was successfully applied to the oilseeds cottonseed, soybean, peanut, flax seed, and sunflower seed; to the grains corn, wheat, oats, barley, sorghum, rye, and rice; and to the tree nuts pistachios, almonds, walnuts, brazil nuts, pecans, and filberts. As little as 10 µg aflatoxin/kg can be detected, and approximate contamination levels can be placed in one of 5 categories, based on the observed intensity of the fluorescent aflatoxin band. **AS**

11 C 320
Mycotoxins.
Pitt, J. I.
Food Technology in Australia **25** (6) 291-294 (1973) [4 ref. En] [CSIRO Div. of Food Res., North Ryde, NSW 2113]

The occurrence of mycotoxins in mouldy foods is briefly discussed, with reference to ergot, alimentary toxic aleukia, aflatoxins, mouldy rice toxins (islanditoxin and luteosykrin) and other mycotoxins (citreoviridin, citrinin, patulin, ochratoxin A and sterigmatocystin). AJDW

11 J 1806
Peanut accessions resistant to seed infection by Aspergillus flavus.
Mixon, A. C.; Rogers, K. M.
Agronomy Journal **65** (4) 560-562 (1973) [16 ref. En] [Plant Sci. Res. Div., USDA, Auburn Univ., Alabama, 36830, USA]

Peanuts (Arachis hypogaea L.) may become infected with strains of Aspergillus flavus Link ex Fr. that produce aflatoxin, a highly toxic substance when ingested by animals in food or feed products. Development of peanuts with resistance to penetration by the fungus would greatly alleviate the possibility of contamination by the health impairing substance. A new laboratory procedure with conditions conducive to optimum growth of Aspergillus flavus revealed that two peanut accessions were resistant to two toxin-producing strains of the fungus. Seed with flesh seedcoat colour from P.I. 337394 had an average of 5% seed infection for hand-picked and hand-shelled samples evaluated at optimum seed maturity in 5 separate evaluations during 4 yr. Aslo, seed infection for samples of P.I. 337409 averaged 9% for similar evaluation. For 2 yr, comparable checks of 2 susceptible accesssions, P.I. 331326 and P.I. 343419, had an average of 92% and 91% seed infection, respectively, and 'Argentine', 'Florunner', and 'Wilco 1' had an average of 34%, 39% and 30%, respectively. AS

11 K 104
Modified method for the determination of mycotoxins in cocoa beans.
Scott, P. M.
Journal of the Association of Official Analytical Chemists **56** (4) 1028-1029 (1973) [12 ref. En] [Health Protection Branch, Dept. of Nat. Health and Welfare, Ottawa, Ontario, Canada K1A OL2]

A modified method for the analysis of cocoa beans for aflatoxins by inclusion of 3% silver nitrate solution in the extraction solvent mixture is described. Recoveries of aflatoxins and ochratoxin A added at levels of 5-45 and 20-300 μg/kg, respectively, were satisfactory. AS

11 M 1417
Modified rapid screening method for aflatoxin in corn.
Shannon, G. M.; Stubblefield, R. D.; Shotwell, O. L.
Journal of the Association of Official Analytical Chemists **56** (4) 1024-1025 (1973) [5 ref. En] [Northern Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

A rapid screening method for detecting aflatoxin in cottonseed products was investigated to determine if it was applicable to corn. Other aflatoxin-extracting solvents and protein-precipitating agents were tried with white and yellow corn. When acetone-water (85 + 15) and a saturated solution of ammonium sulphate were substituted for acetonitrile-water (80 + 20) and lead acetate in the cottonseed method, fewer interferences and more compact fluorescent zones were observed on the developed minicolumns. The modified method for corn was applicable to samples containing 10 parts/billion or more aflatoxin. AS

11 M 1418
Collaborative study of three screening methods for aflatoxin in corn.
Shotwell, O. L.; Stubblefield, R. D.
Journal of the Association of Official Analytical Chemists **56** (4) 808-812 (1973) [6 ref. En] [Northern Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

The 3 rapid screening methods studied all involved chromatography of partially purified extracts on minicolumns. In one method acetonitrile-water is used to extract aflatoxin from corn and a lead acetate precipitation removes impurities from the extracts. The second method specifies acetone-water as the extracting solvent and ammonium sulphate as the precipitant. The third method is based on acetone-water as the extracting solvent and ferric gel as the precipitant. The most sensitive method was the ferric gel precipitation, which could detect 5 parts/billion aflatoxin, but it was very time-consuming. The most satisfactory method (timewise) used the ammonium sulphate and had a sensitivity of 10 parts/billion. This method also led to the best differentiation between levels of aflatoxin. These 2 methods have been adopted as official first action. AS

11 P 1573
[Influence of pH on aflatoxin formation in model experiments with milk powder.] Einfluss des pH-Wertes auf die Aflatoxinbildung in Modellversuchen mit Milchpulver.
Kiermeier, F.; Behringer, G.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **151** (6) 392-394 (1973) [7 ref. De, en] [Milchwissenschaftliches Inst. der Tech. Univ. München, Weihenstephan, Federal Republic of Germany]

Aflatoxin formation was studied in dried milk/water mixtures approximating in moisture content to hard cheese, and inoculated with Aspergillus flavus. This substrate had the advantage over cheese of allowing the initial pH to be readily varied. Aflatoxin production was highest at pH 4.6 and decreased regularly as the initial pH of the substrate approached that of neutrality. Results were more reproducible when sterilized rather than unsterilized substrate was used, perhaps owing to the influence in the latter case of non-aflatoxin-forming microorganisms, whether operating competitively or as organisms capable of degrading the toxins formed. [See FSTA **5** (1973) 4P529 for previous part.] **GTP**

11 S 1303

Tissue distribution and metabolism of aflatoxin B_1-^{14}C in layer chickens.

Mabee, M. S.; Chipley, J. R.

Journal of Food Science **38** (4) 566-570 (1973) [23 ref. En] [Dept. of Poultry Sci., Ohio St. Univ., 674 West Lane Ave., Columbus, 43210, USA]

The effects of administering low levels of aflatoxin B_1-^{14} by crop intubation daily for 14 days to layer chickens were determined. Studies on the distribution of ^{14}C in the blood, selected organs, tissues, eggs and excreta were conducted. No toxic effects were observed in layer chickens during the course of the experiment. The layer chickens excreted 92.15% of the ^{14}C administered. Of the ^{14}C retained, 19.5, 16.1, 3.9, 7.2, 26.4 and 26.9% were detected in the blood, liver, heart, gizzard, breast and leg, respectively. No radioactivity was detected in egg samples collected. Chemical assay of those samples demonstrating radioactivity revealed that 81.2% of the radioactivity in these substrates was soluble in aqueous extracts while approx. 10% was extractable by classical extraction procedures. Treatment of the aqueous extracts for conjugated steroids by treatment with beta-glucuronidase revealed that 31.5% of the ^{14}C detected in the aqueous extract was a liberated glucuronide conjugate of aflatoxin M_1-^{14}C. **IFT**

11 T 571

Persistence of aflatoxin during the fermentation of soy sauce.

Maing, I.-Y.; Ayres, J. C.; Koehler, P. E.

Applied Microbiology **25** (6) 1015-1017 (1973) [7 ref. En] [Food Sci. Dept., Univ. of Georgia, Athens, 30602, USA]

Aflatoxin was produced by Aspergillus parasiticus NRRL 2999 but not by Asp. oryzae during fermentation of soy sauce. Little aflatoxin was degraded within 6 wk unless Lactobacillus delbrueckii also was present. **AS**

12 C 343

Aflatoxin produced by Aspergillus parasiticus when incubated in the presence of different gases.

Shih, C. N.; Marth, E. H.

Journal of Milk and Food Technology **36** (8) 421-425 (1973) [21 ref. En] [Dept. of Food Sci., Univ. of wisconsin, Madison, 53706, USA]

Influence of atmospheric gases on aflatoxin formation by Asp. parasiticus was investigated using chemically defined medium and controlled environments in a fermenter. Max. yield of aflatoxin was obtained under fermentation conditions lacking agitation or sparging of air. Increasing rate of aeration enhanced glucose utilization and acid formation, but reduced toxin production. Replacement of air by various mixtures of O_2 and CO_2, or O_2 and N_2 suppressed toxin formation. Increasing proportions of CO_2 or N_2 in atmosphere enhanced their inhibitory effect on aflatoxin formation, and complete inhibition of toxin synthesis occurred in atmospheres of 100% N_2. Synthesis of toxin was suppressed more by a high concn. of CO_2 than of N_2. The optimal condition for toxin formation was quiescent incubation. Suppression of toxin formation can be achieved by introducing high concn. of CO_2 or N_2 into the environment. **AS**

12 J 1964

Sensitive procedure for aflatoxin detection in peanuts, peanut butter, peanut meal, and other commodities.

Holaday, C. E.; Barnes, P. C., Jr.

Journal of Agricultural and Food Chemistry **21** (4) 650-652 (1973) [5 ref. En] [Nat. Peanut Res. Lab., USDA, S. Region, Peanut Quality Investigations, Dawson, Georgia 31742, USA]

The contamination of peanuts and many other commodities by aflatoxin continues to be a serious worldwide problem. A rapid and reliable screening method is urgently needed for this dangerous toxin. A technique is described which has a sensitivity of about 3-5 parts/billion and which can be completed in approx. 15 min. The procedure is based on millicolumn chromatography and can be used on a number of commodities. Proximate quantitation of the aflatoxin is also possible. **AS**

12 J 2022

Detoxication of aflatoxins in raw peanuts and peanut meal by sodium hypochlorite.

Natarajan, K. R.; Rhee, K. C.; Cater, C. M.; Mattil, K. F.

Abstracts of Papers, American Chemical Society **166**. AGFD 79 (1973) [En] [Texas A&M Univ., College Station, 77843, USA]

Sodium hypochlorite has been tested for detoxication of aflatoxins during the process for the preparation of peanut protein isolate from raw peanuts and defatted peanut meal. Aflatoxins B_1

and B_2 were readily destroyed by sodium hypochlorite. Effects of sodium hypochlorite concn., reaction pH, temp. and time were studied. Results indicate that both the sodium hypochlorite concn. and reaction pH are important factors in reducing the aflatoxin levels in the protein isolates to below detectable quantities. Starting with ground raw peanuts which contained 725 ppb (parts/billion) aflatoxin B_1 and 148 ppb aflatoxin B_2, at pH 8, 0.4% sodium hypochlorite reduced the aflatoxin B_2 content in the isolate from 384 ppb to trace amounts and the aflatoxin B_2 content from 76 ppb to trace amounts. At pH 9, 0.3% sodium hypochlorite reduced the aflatoxin B_1 content in the isolate from 300 ppb to below detectable quantities and the aflatoxin B_2 content from 52 ppb to 2 ppb. Similar results were obtained at pH 10 for 0.3% sodium hypochlorite concentration. In the case of defatted peanut meal which containd 121 ppb aflatoxin B_1 and 36 ppb aflatoxin B_2, 0.25%, 0.20% and 0.15% sodium hypochlorite concentrations at pH 8, 9 and 10, respectively, reduced both the aflatoxin B_1 and B_2 contents to trace amounts from a total aflatoxin level in the isolate of about 90 ppb. Temp. and extraction time did not have any significant effect on the detoxication of aflatoxins. **AS**

COPYRIGHT REGULATIONS

FORM OF DECLARATION AND UNDERTAKING

To the Editor, International Food Information Servise, Shinfield, Reading, RG2 9AT, Berkshire, England.

1. I ....

of ....

hereby request you to make and supply to me a photocopy of the article covered by

Journal name ....

Volume .... Part .... Pages .... Year ....

which I require for the purpose of research or private study.

2. I have not previously been supplied with a copy of the said article/part of the said work by any librarian.

3. I undertake that if a copy is supplied to me in compliance with the request made above, I will not use it except for the purpose of research or private study.

Signature* .... Date ....

(*Note: This must be the personal signature of the person making the request. A stamped or typewritten signature or the signature of an agent is NOT sufficient).

4. Send this form and remittance (10p per page) to the above address.

(Note: Additional forms are available on request).

Additional Services available from IFIS

RETROSPECTIVE SEARCH SERVICE

- Over 60,000 documents in FSTA searched
- State-of-the-art or "quicky" telephone requests accepted
- Annual contracts with discount available
- Cost from £5 per volume of FSTA for references; £7.50 per volume for abstracts
- Information available in 3 output formats
- Searches conducted by qualified food science graduates

PHOTOCOPYING SERVICE

- All journal articles abstracted in FSTA available promptly
- Cost 7p per page for single orders
- Deposit account service in operation
- Original articles available as output from retrieval services at 40p per article.

See also inside front cover

FOOD ANNOTATED BIBLIOGRAPHIES

Selected abstracts from Food Science and Technology Abstracts on important specialized aspects of food science and hnology are now available as Food Annotated Bibliographies (FABs).

The FABs already completed are listed below, and further FABs are in preparation. Suggestions are welcomed for specific ics for additional bibliographies.

B	Title	No. Ref.	Price	Vol. 1-3	No. Ref.	Price	Vol. 4	Vol. 5 (1973) Monthly (12 issues)	
	Application of Reverse Osmosis to Food Processing	104	£2.00	☐	58	£2.00	☐	£4.00	☐
	New Sources of Food Protein	662	£6.00	☐	332	£3.50	☐	£9.00	☐
	Natural and Synthetic Sweeteners	338	£3.50	☐	198	£2.00	☐	£6.00	☐
	Techniques for Analysis of Flavour Volatiles	367	£4.00	☐	237	£2.50	☐	£7.00	☐
	Microwaves in Food Processing	160	£2.00	☐	103	£2.00	☐	£5.00	☐
	Texture Analysis of Foods	426	£4.50	☐	429	£4.50	☐	£11.00	☐
	Synthetic Dairy Products	150	£2.00	☐	88	£2.00	☐	£4.00	☐
	Acidulants in Foods	413	£4.50	☐	200	£2.50	☐	£7.00	☐
	Agglomeration of Powders	73	£2.00	☐	34	£2.00	☐	£4.00	☐
	Aseptic Packaging	131	£2.00	☐	79	£2.00	☐	£4.00	☐
	EEC Regulations	55	£2.00	☐	64	£2.00	☐	£4.00	☐
	Toxicology of Food Additives	118	£2.00	☐	106	£2.00	☐	£5.00	☐
	Deep Fat Frying	400	£4.00	☐	248	£2.50	☐	£7.00	☐
	Viscosity of Foods	399	£4.00	☐	212	£2.50	☐	£7.00	☐
	Taste Panels in Food Science	78	£2.00	☐	86	£2.00	☐	£4.00	☐
	Taints in Foods	126	£2.00	☐	77	£2.00	☐	£4.00	☐
	Microbial Toxins in Foods	113	£2.00	☐	87	£2.00	☐	£4.00	☐
	Smoked Food Products	249	£2.50	☐	112	£2.00	☐	£5.00	☐
	Disposal of Waste Food Products	395	£4.00	☐	262	£3.00	☐	£8.00	☐
	Use of Glucose in Food Products	124	£2.00	☐	99	£2.00	☐	£4.00	☐
	Emulsifiers in Foods	253	£3.00	☐	161	£2.00	☐	£6.00	☐
	Stabilizers in Food	222	£2.50	☐	250	£3.00	☐	£8.00	☐
	Staling and Anti-staling Additives	58	£2.00	☐	25	£2.00	☐	£4.00	☐
	Catering Industry	51	£2.00	☐	29	£2.00	☐	£4.00	☐
	Antioxidants (in preparation)								
	Nitrosamines	31	£2.00	☐	32	£2.00	☐	£4.00	☐

ol. 1-2 only

Suggested topics for FABs..................

l and Retrospective Searches

The International Food Information Service is now able to provide selective dissemination of information and retrospective rches.

I require an SDI/Retrospective Search on the following topics.

Please send me an estimate..

Prices include postage by surface mail. For airmail rates, please apply to the address below.

To order, or to obtain further information, mark the item required, add your name and address, and send cash, cheque or stal order to :

International Food Information Service,
Commonwealth Bureau of Dairy Science and Technology,
Shinfield, Reading RG2 9AT, England.

Name ....

Address ....

....

....

NTERNATIONAL FOOD INFORMATION SERVICE

ifis

FAB 34

February 1975

AFLATOXINS

SELECTED FROM VOLUME 6
FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

PRICE £2.00

sponsored by

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks; Institut für Dokumentationswesen, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen; Zentralstelle für maschinelle Dokumentation, Frankfurt am Main.

Services available from IFIS

AWARENESS

- Monthly searches of FSTA
- Personalized, computer assisted service
- Information available in 3 output formats
- Cost from £10 per year for references; £15 per year for abstracts
- Information selected to match your requirements on any aspect of Food Science and Technology

C TAPES

- Contains all information in FSTA, bibliographic data, abstracts, author and subject indexes
- 7– and 9– track IBM tapes available
- "Clean" tapes suitable for computer retrieval
- Cost £700 per year

Enquiries concerning the magnetic tape service should be addressed to;–

Dr. U. Schützsack
Institut für Dokumentationswesen,
6 Frankfurt/Main-Niederrad,
Herriostrasse, W. Germany.

INTRODUCTION

Food Annotated Bibliographies (FABs) are collections of abstracts specific topics in food science and technology. The topics are osen by the staff of the International Food Information Service as ing of particular interest or importance. The topics normally terest individual workers, who may not require the full information ovided in Food Science and Technology Abstracts, from which the stracts for the FABs are taken. The size and the cost of the FABs e controlled as much as possible with the interests of individual rkers in mind.

Titles of the FABs now available are given on the back cover of is booklet. New titles are being added at the rate of about 10-20 er year. For up-to-date lists of FABs or suggestions for new topics lease write to the address given overleaf. New subjects are searched r at least the five most recent volumes of Food Science and Technology stracts. Thereafter each FAB is updated monthly. Copies of each nths abstracts on any topic may be obtained as indicated on the back ver of this publication. At the end of each volume of up-dating, e abstracts are merged and made available as a separate supplement to e original FAB.

Some of the larger FABs have been divided into sections to acilitate use. Abstracts are not printed in more than one section. e larger FABs also have subject indexes provided.

Copies of all original articles referred to in the abstracts may bought (or occasionally borrowed) from the International Food formation Service. A form for ordering these is provided at the d of this FAB.

Coverage of the subject has been restricted to that of Food Science d Technology Abstracts, which covers over 1200 of the important food urnals, patents from 20 countries and books published world-wide. ery effort is made to include all significant references, but itorial discretion is used on the many articles of borderline interest. the reader particularly needs an exhaustive search of the subject, will be pleased to provide any other references that we have ailable. We would in any case encourage readers to write or lephone us with any comments or queries that they may have.

J. NEWTON,
ASSISTANT EDITOR

1

Symposium on the control of mycotoxins.
International Union of Pure & Applied Chemistry
Sweden, Swedish National Committee for Chemistry
Pure and Applied Chemistry **35** (3) 209-313 (1973) [many ref. En]

This issue of the journal contains special lectures presented at the symposium on the Control of Mycotoxins, held in Göteborg, Sweden, in Aug. 1972 under the auspices of the International Union of Pure & Applied Chemistry, Food Contaminants Commission (Food Section), and the Swedish National Committee for Chemistry. The papers include: Study of toxins isolated from grain infected with Fusarium sporotrichioides, by M. A. Akhmeteli, A. B. Linnik, K. S. Cernov[Chernov], V. M. Voronin, A. Ja. Hesina [A. Ya. Khesina], N. A. Guseva & L. M. Sabad (pp. 209-215, 6 ref.); Review of the toxicology of aflatoxin, by W. H. Butler (pp. 217-222, 28 ref.); Learning to live with mycotoxins: aflatoxin - a case history, by L. A. Goldblatt (pp. 223-238, 28 ref.); Control of aflatoxins in the food industry, by E. Hanssen & M. Jung (pp. 239-250, 24 ref.); Recent research for the control of mycotoxins in cereal, by C. W. Hesseltine (pp. 251-257, 6 ref.); New methods for rapid detection of aflatoxin, by C. W. Hesseltine & O. Shotwell (pp. 259-266, 7 ref.); Collaborative studies on the determination of aflatoxins in peanut products in France, by M. Jemmali (pp. 267-270, 9 ref.). HBr

2

Symposium on the control of mycotoxins.
International Union of Pure & Applied Chemistry
Sweden, Swedish National Committee for Chemistry
Pure and Applied Chemistry **35** (3) 209-313 (1973) [many ref. En]

[Continued from preceding abstr.] Aflatoxin residues in fluid milk, by F. Kiermeier (pp. 272-273, 11 ref.); Aflatoxin residues in bacon pigs, by P. Krogh, B. Hald, E. Hasselager, A. Madsen, H. P. Mortensen, A. E. Larsen & A. D. Campbell (pp. 275-281, 11 ref.); The control of aflatoxin residues in food of animal origin, by I. F. H. Purchase (pp. 283-289, 35 ref.); Analysis of aflatoxin M_1 in liquid and powdered milk, by P. L. Schuller, C. A. H. Verhülsdonk & W. E. Paulsch (pp. 291-296, 22 ref.); Extraction and determination of Aspergillus flavus metabolites - aflatoxins from meat products, by E. L. Strzelecki (pp. 297-307, 17 ref.); and Chemical and biological detection of 12,13-epoxytrichothecenes isolated from Fusarium species, by T. Tatsuno, K. Ohtsubo & M. D. Saito (pp. 309-313, 22 ref.). HBr

3

[Purity of enzyme preparations. Mycotoxins.]
Fournier, P.-E.
Annales de Technologie Agricole **21** (4) 607-6
(1972) [23 ref. Fr, en, de] [Fac. de Med. de
Univ., Paris VII^e, France]

Hazards arising during the manufacture of
enzymes on an industrial scale and from the
addition of large doses of enzymes to foodstuff
discussed. The possible contamination of enzym
with mycotoxins is considered. MEG

4

**Inhibition of aflatoxin and zearalenone biosyn
with dichlorvos.**
Rao, H. R. G.; Harein, P. K.
***Bulletin of Environmental Contamination and
Toxicology*** **10** (2) 112-115 (1973) [24 ref.
[Dept. of Entomology, Fisheries and Wildlife,
Univ. of Minnesota, St. Paul, 55101, USA]

The possible use of dichlorvos (2,2-dichloro
dimethyl phosphate) to inhibit synthesis of the
metabolites aflatoxin (by Aspergillus flavus) a
the oestrogen zearalenone (by Fusarium roseu
var. graminearum) was investigated. Asp. flav
(NRRL-2999) was grown on autoclaved whea
7 days at 27°C and 70% RH, and Fusarium ro
on a wheat-rice mixture for 6 wk at 27°C/70%
followed by 8 wk at 10°C. Both substrates wer
adjusted to 20% moisture content and treated
dichlorvos to give a residue of 20 ppm. The
dichlorvos completely prevented production o
aflatoxin and zearalenone, although vegetative
growth of the moulds appeared to be normal;
average figures for untreated substrates were
ppm aflatoxin and 149 ppm zearalenone. E

5

**Investigation of instrumental measurements to
determine aflatoxin in florisil columns.**
Velasco, J.; Norris, K. H.
Journal of the American Oil Chemists' Society
(9) 385 (1973) [4 ref. En] [USDA, Agric.
Marketing Res. Inst., Beltsville, Maryland 207
USA]

Investigation has shown that fluorescence o
aflatoxin, in small columns layered with florisil
be measured with a low cost fluorometer. Afla
levels approaching the 1 part/billion level wer
detected in these micro-columns with a simple
fluorometer. [See also FSTA (1972) 4 7C166.
AS

6

Collaborative studies on the determination of aflatoxins in peanut products in France.
Jemmali, M.
Pure and Applied Chemistry **35** (3) 267-270 (1973) [9 ref. En] [INRA, Sta. de Biochimie & Physico-chimie des Cereales (Service de Mycotoxins), 16 Rue Nicolas Fontin, Paris 75013, France]

In order to develop a method for the determination of aflatoxins in peanuts, peanut products, cereals and cereal products (major components of feed), a study was made of some existing procedures (CB, TPI, BF, Celite, Pons). Collaborative studies using these procedures were undertaken. The CB procedure was selected on account of the quality of the obtained extract, the low level of background interference and the relative precision and simplicity of the required equipment. Taking into account the very frequently high level of aflatoxin B_1 (around 1 ppm) in peanut and the quality of silica gel and chloroform available in France, some minor changes have been incorporated into the CB procedure: the chloroform used for the column is washed and dried before use, the volume of elution is increased and an ether-methanol-water mixture (96:3:1) is used as a developing system. AS

7

Effect of roasting on aflatoxin content of artificially contaminated pecans.
Escher, F. E.; Koehler, P. E.; Ayres, J. C.
Journal of Food Science **38** (5) 889-892 (1973) [21 ref. En] [Dept. of Food Sci., Univ. of Georgia, Athens, 30602, USA]

Dry roasting at 191°C for 15 min reduced the concn. of aflatoxin B_1 and G_1 in artificially contaminated seedling pecan halves (500 halves/lb) by 80%, in Stuart pecan halves (240 halves/lb) by 45%, and in pecan meal by 60%. Roasting of these nutmeats in coconut oil at 375°F for 6 min or in margarine at 107°C for 60 min lowered the concn. by 60%. 3% of the quantity of toxin initially introduced was found in the oil or margarine bath after roasting. No survival of mould was observed on halves after any of the 3 treatments. IFT

8

New methods for rapid detection of aflatoxin.
Hesseltine, C. W.; Shotwell, O.
Pure and Applied Chemistry **35** (3) 259-266 (1973) [7 ref. En] [Regional Res. Lab., Peoria, Illinois 61604, USA]

The rapid detection of mycotoxin contamination in agricultural commodities is an area of research that requires more attention. The many companies buying hundreds of bushels of cereal grains daily, need to inspect their purchases immediately and to make a decision in minutes. Arising from this need to detect aflatoxin, 2 methods were developed for rapid identification of aflatoxin in corn. The first is based upon a glowing greenish-gold fluorescence produced under UV light (353 nm) by corn kernels that contain aflatoxin. The fluorescent material is not aflatoxin but a compound associated with it. Fluorescence depends upon the interaction between enzymes in corn and a compound produced by members of the Aspergillus flavus series. Heat-sterilized corn inoculated with Asp. parasiticus does not fluorescence, although aflatoxin is formed. Fluorescence is seen in broken kernels but it is not visible in intact corn kernels until they are broken. Laboratory studies show that this method of detection is applicable for other cereals, including wheat, rice, oats and barley, but is apparently not effective for soybeans and peanuts. The second is a modification of the chromatographic mini-column method devised for corn. AS

9

Aflatoxin detection by high-speed liquid chromatography and mass spectrometry.
Rao, G. H. R.; Anders, M. W.
Journal of Chromatography **84** (2) 402-406 (1973) [8 ref. En] [Dept. of Pharmacology, Univ. of Minnesota, Minneapolis, 55455, USA]

The method employs a Varian Series 4000 liquid chromatograph and a 1 m × 1.8 mm stainless steel column packed with silica gel (Sil-X) at room temp., inlet pressure 250 lb/in^2 and flow rate 24 ml/h. Eluents used are either isopropyl ether-tetrahydrofuran (88:12) or diethyl ether-cyclohexane (75:25). Detection is by UV absorption at 254 nm. 2 peaks corresponding to aflatoxins B_1 and G_1 were obtained. A mass spectrometer is used for confirmation of the peaks. Chromatograms and mass spectra for a crude extract of grain infested with Aspergillus flavus and for pure aflatoxins B_1 and G_1 are illustrated. An advantage of the method is that photodegradation products of aflatoxins (which have retention times similar to aflatoxin G_1) can be recognized. The method is specific and sensitive to as little as 1 µg aflatoxin injected on the column. ELC

10

Bright greenish-yellow fluorescence and associated fungi in white corn naturally contaminated with aflatoxin.
Fennell, D. I.; Bothast, R. J.; Lillehoj, E. B.; Peterson, R. E.
Cereal Chemistry **50** (4) 404-414 (1973) [22 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

Good correlation was observed between presence of Aspergillus flavus Link ex Fr., a bright greenish-yellow (BGY) fluorescence, and aflatoxin in a naturally contaminated white corn. However, Asp. flavus was observed on nonfluorescent whole undamaged kernels that assayed at <20 ppb (parts/billion) and on nonfluorescent whole damaged kernels and fragments that assayed at 3000 ppb. Whole damaged kernels that failed to

fluoresce externally yielded some fluorescing fragments when coarse ground. Routinely, BGY fluorescence in whole corn was observed on the face of the kernels immediately above the germ, and in sectioned kernels the emission was generally restricted to a narrow region outlining the germ. Usually, initial development of Asp. flavus was confined to the germ region. Isolates of Asp. flavus from aflatoxin-contaminated corn could be separated into 4 groups on gross cultural characteristics. 2 of 4 isolates selected as representative of these groups exhibited aflatoxin-production capability, whereas all 4 synthesized kojic acid, the presumed precursor of the BGY fluorescence. AS

11

Analysis of afltoxins M_1 in liquid and powdered milk.
Schuller, P. L.; Verhülsdonk, C. A. H.; Paulsch, W. E.
Pure and Applied Chemistry **35** (3) 291-296 (1973) [22 ref. En] [Nat. Inst. of Public Health, PB1, Bilthoven, Netherlands]

A simple and rapid isolation procedure based upon the so-called Celite procedure for aflatoxin B_1 determination in peanut products can be used in combination with 2-dimensional TLC for the determination of aflatoxin M_1 in liquid milk and dried milk. The improved separation of the aflatoxin M_1 from the interfering substances by this technique on the thin-layer chromatogram permits the measurement of aflatoxin M_1 with a fluorodensitometer. The method is sensitive to 0.05 µg aflatoxin M_1/l. liquid milk and to 0.5 µg/kg dried milk. AS

12

Extraction and determination of Aspergillus flavus metabolites - aflatoxins from meat products.
Strzelecki, E. L.
Pure and Applied Chemistry **35** (3) 297-307 (1973) [17 ref. En] [Vet. Hygiene Res. Sta., Gdansk, Poland]

On the basis of many methods for the extraction and determination of aflatoxins from cereals a method of aflatoxin extraction in meat products was elaborated. Methanol-water and chloroform solvents were used for the extraction, and a petroleum ether-benzene-hexane mixture was used for defatting the samples. Thirty different combinations of solvents were selected to find the best of them for developing TLC plates. Separation of the interfering substances of meat extracts from aflatoxins and resolution of 4 aflatoxins (B_1, B_2, G_1 and G_2) were obtained when a combination of hexane, petroleum ether, benzene, chloroform and acetone were used. AS

13

Aflatoxin residues in bacon pigs.
Krogh, P.; Hald, B.; Hasselager, E.; Madsen, A.; Mortensen, H. P.; Larsen, A. E.; Campbell, A. D.
Pure and Applied Chemistry **35** (3) 275-281 (1973) [11 ref. En] [Inst. of Hygiene & Microbiol., Agric. Univ., Copenhagen, Denmark]

Bacon pigs were fed diets containing 300 and 500 ppb (parts/billion) aflatoxin $B_1 + B_2$ during a long period (120-231 days). When organs and tissues were examined for residues, sizable amounts of aflatoxins (max. 54 ppb) were detected. Since macroscopic alterations were slight in livers and absent in other organs and tissues, most livers and all other organs and carcass could have passed meat inspection and been distributed for human consumption. This calls for careful control of animal feed, in order to avoid the use of heavily contaminated batches. AS

14

[Residues in meat: antibiotics and mycotoxins.]
Rückstände in Fleisch: Antibiotika und Mykotoxine.
Schmidt, V.; Mintzlaff, H.-J.
Fleischwirtschaft **53** (9) 1211-1212 (1973) [De] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

Reduction of antibiotics residues in meat by restricting the feeding of nutritional doses to the first half of fattening period and feeding antibiotics-free fodder in the weeks preceding slaughter is recommended. Only antibiotics that do not induce transferable resistance should be used, e.g. flavomycin, Zn-bacitracin or nitrovin. Therapeutic administration should be legally controlled. While no mycotoxins could be detected in fermented sausages after ripening with some toxigenic strains and added penicillic acid was quickly inactivated, stored sausages contaminated with Aspergillus versicolor (a frequent contaminant, especially of meat products of low water activity) contained sterigmatocystin on skins and meat. Broiler feeding trials indicated the presence of aflatoxin residues in muscle and viscera after feeding a diet containing ≥5 ppm aflatoxin. RM

15

Application of liquid chromatography in food analysis.
Weerdhof, T. van de; Wiersum, M. L.; Reissenweber, H.
Journal of Chromatography **83** (1/2) 455-460 (1973) [4 ref. En] [Unilever Res. Duiven, Zevenaar, Netherlands]

Methods are described for measuring vitamin A, thiamin, riboflavin and β-carotene in foods using liquid chromatographic (LC) analysis. Vitamin A and β-carotene were measured after refluxing the sample with KOH in ethanol and extraction of the vitamin activity into hexane. Foods to be analysed for thiamin and riboflavin were incubated with

takadiastase and papain before precipitation of the proteins with trichloracetic acid solution. Conditions for the LC analysis and detection of the different vitamins are described and some chromatograms of vitamin A in potatoes and chicken, thiamin and riboflavin in potatoes and pork and β-carotene in spinach and tomato soup are shown but no values are given. The limit of detection is 5 μg for β-carotene and 2 μg for the other vitamins. The method has also been used to measure 3,4-benzpyrene in sausages, aflatoxins in groundnuts, and flavour components in natural products.   MEG

16

Control of aflatoxins in the food industry.
Hanssen, E.; Jung, M.
Pure and Applied Chemistry **35** (3) 239-250 (1973) [24 ref. En] [H. Bahlsens Keksfabrik KG, Hanover, Federal Republic of Germany]

The contamination of foods with aflatoxins was evaluated in an extensive series of experiments. Aspects investigated include: the aflatoxin content and mould flora of spontaneously mouldy foods (nuts, oilseeds, nutmeg, fruit, vegetables, cereals, bread, cheese and bacon); migration of aflatoxins into foods (including coconut, whole-meal wheat bread and cheese); occurrence of aflatoxins in foods showing no visible mould or spore infection (as a result of removal of moulds during processing, diffusion of aflatoxins into seeds while still in the ovary or shell, formation of aflatoxins during manufacture of marzipan or persipan, and transfer of aflatoxin from feed to animal products e.g. milk). Recommended storage conditions for prevention of growth of moulds and formation of aflatoxins are discussed, together with variations in the aflatoxin content in peanuts as a result of different harvesting and storage conditions. Detailed tables are given of the aflatoxin contents of the foods studied.
AJDW

17

Semiquantitative estimation of aflatoxins on thin-layer chromatograms with a gray scale.
Reiss, J.
Analytical Biochemistry **55** (2) 643-645 (1973) [2 ref. En] [Mikrobiol. Lab., Grahamhaus Studt KG, 655 Bad Kreuznach, Federal Republic of Germany]

The disappearance of the fluorescence of aflatoxin spots on thin layer chromatograms by zones with different shades of grey of a Kodak grey scale is the basis of a technique for the semiquantitative estimation of aflatoxins. Standard curves for B_1 and G_1 are given.   AS

18

Metabolism as a factor in determining the toxic action of the aflatoxins in different animal species. [Review]
Patterson, D. S. P.
Food and Cosmetics Toxicology **11** (2) 287-294 (1973) [42 ref. En] [Central Vet. Lab., Weybridge, Surrey, UK]

The present state of knowledge on the metabolic fate of aflatoxin B_1 and other aflatoxin molecules in the livers of avian and mammalian species is reviewed and an attempt made to relate metabolism to toxic action.   VJG

19

[Analytical problems in the detection of mycotoxins.] Analytische Probleme beim Nachweis von Mykotoxinen.
Bösenberg, H.
Bericht über die Getreidechemiker-Tagung **7** (146) 125-133 (1972) [11 ref. De] [Lehrstuhl für Mikrobiol., Tech. Univ., Hannover, Federal Republic of Germany]

See FSTA (1973) **5** 8C228.

20

Distribution of aflatoxin in the various fractions separated from groundnut meal.
Basappa, S. C.; Shankarmurti, A.; Murthy, V. S.; Parpia, H. A. B.
Indian Journal of Technology **10** (10) 395-396 (1972) [4 ref. En] [Central Food Tech. Res. Inst., Mysore 2A]

The data presented in this communication show that nearly 60% of the total toxin present in groundnut cake flour is associated with the protein; thus preparation of protein isolate from groundnut cake flour for human consumption results in concn. of the toxin. The health hazards of even very low levels of the toxin and the need for a process for the total elimination of aflatoxin are stressed. It is suggested that a detoxification step involving oxidation of the toxin with H_2O_2 be incorporated in the processing line for the preparation of protein isolate.   AA

21

[Presence of aflatoxin B_1 in grape wines.]
Lemieszek-Chodorowska, K.; Snycerski, A.
Roczniki Panstwowego Zakladu Higieny **22** (5) 527-529 (1971) [9 ref. Pl, ru, en] [Zaklad Badania Zywnosci i Prezdmiotow Uzytku Panstwowego Zakladu Higieny, Warsaw, Poland]

No detectable amounts of aflatoxin B_1 were present in grape wines analysed by TLC. Toxin added to wine samples could be detected at concn. $\geq$5 μg/1000 ml. To remove ballast materials with UV fluorescence, the plates were developed first in chloroform and subsequently in the correct solvent (chloroform-methanol, 98:2).   AS

22

Aflatoxin incidence in peanuts as affected by harvesting and curing procedures.
Troeger, J. M.; Williams, E. J.; Holaday, C. E.
Oleagineux **25** (4) 213-216 (1970) [6 ref. En]
[Univ. of Georgia, Coll. of Agric. Expt. Sta., Coastal Plain Sta., Tifton, USA]

Effects of holding treatments (windrow exposure for 0, 3 and 7 days; different types of holding treatment - no air flow, 1 $ft^3/min/ft^3$ flow, N_2 atm., CO_2 atm.; holding time - 0, 24, 48 and 72 h), high humidity treatments (initial moisture level >30 to <15%) and maturity - from 14 days before to 14 days after projected harvest date, on aflatoxin contamination were investigated. It was shown that aflatoxin production was suppressed by using anaerobic atm. Aeration of peanuts without drying did not suppress aflatoxin compared with peanuts held with no air flow. Aeration may encourage aflatoxin development. Aflatoxin developed when high moisture peanuts were held for only 24 h. Peanuts in the windrow which were subjected to poor drying after rain were more likely to develop aflatoxin than those which were dried immediately after rain. Peanuts with moisture contents >30% had less aflatoxin when subjected to high humidity than those with <30%. Spanish peanuts developed more aflatoxin than Runner or Florigiant and immature peanuts showed less susceptibility to aflatoxin contamination. VJG

23

A new benzene-ethanol-water solvent system for TLC separation of aflatoxins.
Waltking, A. E.; Bleffert, G. W.; Chick, M.; Fogerty, R.
Journal of the American Oil Chemists' Society **50** (10) 424-425 (1973) [3 ref. En] [Best Foods Res. Center, Union, New Jersey 07083, USA]

Gas liquid chromatography was used to determine the composition of the benzene-ethanol-water (BEW) solvent system frequently used in the separation of aflatoxins by thin layer chromatography. Investigation of a rapid procedure for preparing and using this solvent system led to the discovery of a new BEW solvent system with advantages for the routine determination of aflatoxins in roasted nut products, which consists of benzene-ethanol-water 40:6:3 for the trough solution and 4:27:20 for the bottom solution. AS

24

[Aflatoxin B_1 content during bread manufacture.]
Das Verhalten des Aflatoxin B_1 im Verlauf der Brotbereitung.
Jemmali, M.; Lafont, P.
Bericht über die Getreidechemiker-Tagung **6** (142) 71-78 (1971) [11 ref. De] [Sta. de Biochimie et Physico-chimie des Cereales, INRA, 16 rue Nicolas Fortin, Paris, France]

See FSTA (1972) 4 12M1399.

25

[INTERLAB - Seminar 'Dried milk and whey'.]
Gegenwärtiger Stand der Milchpulveruntersuchung INTERLAB-Seminar "Milch- und Molkepulver".
Klupsch, H. J.
Deutsche Milchwirtschaft **24** (39) Beilage Lebensmittel-Labor 3, IV-XI (1973) [1 ref. De]
[Bockum-Hövel, Federal Republic of Germany]

Abstracts are included of the following papers presented at the seminar, held in Kempten (Allgäu) during 22-24 May 1973: Problems of moisture determination in dried milk and dried whey, by H. Mair-Waldburg (pp. V-VI); Effect of the method on results of bacterial count determination, by Lübenau-Nestle (p. VI); Staphylococci in dried milk, by R. Demeter (pp. VI-VII); Anaerobic and aerobic spore-formers, by K. J. Zaadhof (p. VII); Aflatoxins and staphylococcal enterotoxins, by G. Terplan (pp. VII-VIII); Problems in and techniques of sampling, and packaging and dispatch of samples, by F. Voll (p. VIII); Threshold value test and triangle test, by D. Rohse (p. IX); Effect of manufacture on quality criteria and composition of dried whey, by E. Engl (p. IX); Lysine and fructose lysine - quality problems, by H. Erbersdobler (pp. IX-X); and Organoleptic testing of dried milk and dried whey, by F. Beyer (p. XI). FL

26

Aflatoxin M_1 in milk: evaluation of methods.
Stubblefield, R. D.; Shannon, G. M.; Shotwell, O. L.
Journal of the Association of Official Analytical Chemists **56** (5) 1106-1110 (1973) [11 ref. En]
[N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

6 published methods for the determination of aflatoxin M_1 in liquid and dried milk were compared because a quantitative assay sensitive to 0.1 µg/l. was needed for routine analysis. Each method was tested with both spiked and naturally contaminated samples at levels of 0.1, 0.5, and 1 µg/l. or 1, 5, and 10 µg/kg; recoveries of M_1 were determined. Data revealed that 2 methods, one for liquid milk and one for dried milk had the desired sensitivity and recoveries. In the liquid milk method, M_1 is extracted and milk protein is precipitated simultaneously with methanol-water (4 + 1); in the powdered milk method, M_1 is extracted with acetone-water (70:30) and milk protein is then precipitated with a lead acetate solution. Both methods remove fats from the aqueous acetone or methanol solutions with hexane before partition of M_1 into chloroform. Aflatoxin M_1 is determined by TLC of the chloroform extracts and either visual or densitometric measurement of mycotoxin on thin layer plates. Modifications were made to simplify the methods and to reduce the time required to complete the assays. AS

27

[Aflatoxins in milk and milk products: review and research.]
Zappavigna, R.; Cerutti, G.
Latte 47 (6) 399-404 (1973) [62 ref. It, fr] [Univ. degli Studi di Milano, Italy]

The literature on the presence and determination of aflatoxins in milk and milk products is reviewed. In preliminary experiments, aflatoxins were clearly demonstrated in cultures of Aspergillus flavus 373 on a milk medium after 17 days but were presented on a Difco YM medium after only 4 days. The adequacy of the detection using TLC on an acetone extract was confirmed. The method could be slightly improved by using 2 mobile phases, ether followed by chloroform/acetone/water (88/12/1.5). JMD

28

Aflatoxin residues in fluid milk.
Kiermeier, F.
Pure and Applied Chemistry 35 (3) 271-273 (1973) [11 ref. En] [Südd. Versuchs- & Forschungsanstalt für Milchwirtschaft, Tech. Univ., Munich, Federal Republic of Germany]

The content limit for aflatoxin B_1 in feedstuffs tolerant by the European Common Market Commission (0.05 mg/kg) can result in the presence of aflatoxin M_1 in milk (1.5% of aflatoxin intake). The concn. of aflatoxin M_1 in milk varies with the feedstuff used harvesting and storage conditions, and season of the year. Aflatoxin residues in milk are proportional to the level of concentrates fed. Results were obtained by TLC, chemical reactions and fluorescent spectra. EW

29

Fungal toxins in foods. [Review]
Walbeek, W. van
Canadian Institute of Food Science and Technology Journal 6 (2) 96-105 (1973) [many ref. En] [Food Adivsory Bureau, Health Protection Branch, Nat. Health & Welfare, Ottawa, Ontario]

The topic is reviewed under the following headings: aflatoxin (chemistry, toxicity, potential aflatoxin residues in food of animal origin, aflatoxin producing fungi, substrates supporting aflatoxin production, factors influencing toxin production, crops susceptible to fungal invasion prior to harvest, international control of aflatoxins, aflatoxins in hot humid regions and in temperate regions); ochratoxin A (chemistry, toxicity, production by Aspergillus ochraceus spp., source of ochratoxin producing aspergilli, natural occurrence of ochratoxin and citrinin, influence of low temp. on toxin production, occurrence of ochratoxin in [illegible] wheat, beans and other foods); [illegible] acid and patulin. VJG

30

Excretion and metabolism of orally administered aflatoxin B_1 by rhesus monkeys.
Dalezios, J. I.; Hsieh, D. P. H.; Wogan, G. N.
Food and Cosmetics Toxicology 11 (4) 605-616 (1973) [14 ref. En, fr, de] [Dept. of Environmental Toxicology, Univ. of California, Davis, 95616, USA]

When aflatoxin B_1 adsorbed on casein was given orally to male rhesus monkeys, aflatoxin M_1 was the major urinary metabolite. A male rhesus monkey of 3 kg body wt. fed 45 µg aflatoxin excreted in the urine approx. 8 µg aflatoxin M_1 during the first 24-h period. If man metabolizes ingested aflatoxin B_1 in a pattern similar to that of the monkey, urinary aflatoxin M_1 would be an appropriate index for estimating toxin introduction. VJG

31

Detection of aflatoxins in wines.
Lehtonen, M.
Chemie Mikrobiologie Technologie der Lebensmittel 2 (6) 161-164 (1973) [17 ref. En, de, fr] [Res. Lab. of the St. Alcohol Monopoly (Alko), Helsinki, Finland]

Aflatoxins were isolated from 22 wines by column chromatography. For removal of other compounds which fluoresced under UV light, thin layer chromatograms were developed with Na_2SO_4-dried diethyl ether. The final treatment was performed with 2 different solvent mixtures. Identification and quantitative determination of aflatoxins were effected by TLC, and visual comparison of the fluorescence intensity of sample spots with those of standard aflatoxin spots. Occurrence of aflatoxins was confirmed by spraying the developed thin layer chromatograms with 50% H_2SO_4. The lowest detectable amount of aflatoxins was found to be 1 µg/l., and their recovery exceeded 90%. The method was tested by addition of aflatoxins of known amounts to all the wines investigated. The aflatoxin content of Spanish malaga wine was found to be <3 µg/l. An aflatoxin content of <2 µg/l. was found in Algerian red wine, Hungarian red wine, Portuguese red port wine, and yugoslavian Cabernet wine. All the muscatel and white wines studied, with the exception of Hungarian Tokay wine, type Szamorodni, were found to be free of aflatoxins. The aflatoxin content of Tokay wine and the other wines investigated was found to be <1 µg/l. AS

32

[Analysis of aflatoxins in wine.] Kritischer Beitrag zur Analytik vom Aflatoxinen im Wein.
Drawert, F.; Barton, H.
Allgemeine Deutsche Weinfachzeitung 106 (46) 1247-1250 (1973) [29 ref. De] [Inst. für Chem.-Tech. Analyse & Chem. Lebensmitteltech., D-8050 Freising-Weihenstephan, Federal Republic of Germany]

A method for detection of aflatoxins in wines is

described. The aflatoxin is extracted 3 times with chloroform; the chloroform is then evaporated off, and the residue is dissolved in a 98:2 mixture of benzene and acetonitrile. The resulting solution is then analysed by 2-dimensional TLC on Kieselgel 60 plates; the first development is with ether to remove interfering substances. The aflatoxin spots are identified by UV fluorescence. Concn. of 0.05 µg aflatoxin/l. wine may be determined; recovery was found to be 90-100%. The method permits clear discrimination between aflatoxins B_1, B_2, G_1, and G_2. Studies on 17 samples of 1970 and 1971 Rheinpfalz white wines showed that none contained aflatoxins. TUB-IGB

33

Aflatoxin and rubratoxin produced by Aspergillus parasiticus and Penicillium rubrum when grown independently, associatively, or with Penicillium italicum or Lactobacillus plantarum.
Aldermann, G. G.; Emeh, C. O.; Marth, E. H.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 153 (5) 305-311 (1973) [22 ref. En, de] [Dept. of Food Sci., Univ. of Wisconsin, Madison, USA]

Asp. parasiticus (i) and P. rubrum (ii) were grown separately, associatively, or in combination with P. italicum (iii) and/or L. plantarum (iv). A glucose-salts broth and single strength and conc. grapefruit juice served as substrates. In broth incubated at 28°C for 7 days, production of aflatoxin by (i) was enhanced when the culture also contained (ii) + (iv), was unaffected by (iii), and was reduced by (ii), (ii) + (iii), or (iv). Production of aflatoxin in single strength grapefruit juice held at 28°C for 7 days was enhanced when (i) grew together with (ii) and (iv). Presence of all other cultures or combinations reduced aflatoxin production. Similar results were obtained with conc. grapefruit juice except that less aflatoxin was produced by all combinations of cultures. Rubratoxin production in broth was enhanced when (ii) grew in association with (i). All other combinations of cultures yielded less rubratoxin than did (ii) by itself. In single strength grapefruit juice, (i) caused a marked decline in rubratoxin production. Slight increase in yield of rubratoxin were obtained when cultures contained (iv) or (i) + (iv). Other combinations of cultures neither enhanced nor reduced rubratoxin production. All combinations of cultures enhanced rubratoxin production in conc. grapefruit juice with the highest yield appearing when (i) and (iv) grew together with (ii). Production of rubratoxin was similar in single strength and conc. grapefruit juice. AS

34

Aflatoxin production in some varieties of soybeans (Glycine max. L.).
Nagarajan, V.; Bhat, R. V.; Tulpule, P. G.
Experientia 29 (10) 1302-1303 (1973) [15 ref En, de] [Nat. Inst. of Nutr., Indian Council of Med. Res., Hyderabad-7, India]

5 varieties of soybeans were inoculated with Aspergillus flavus or A. parasiticus and any subsequent production of aflatoxin assessed by TLC. Toxin production by the fungi on a synthetic medium was also measured. Wide variations in aflatoxin content were found in the different varieties of soybeans (from 0.125 ppm in Lee variety using A. flavus NIN 25 to 31.25 ppm in JS-2 using A. parasiticus). Amount of toxin was closely related to the toxin-producing potential of the fungal isolate used and the genotype of the soybean. Toxin production by A. flavus was markedly lower than that produced by A. parasiticus. It is generally believed that soybeans are a very poor substrate for aflatoxin production. PG

35

[Cereal chemists' conference of the study group for cereal research held in Detmold on 22-24 May, 1973.] Getreidechemiker-Tagung 1973 der Arbeitsgemeinschaft Getreideforschung vom 22. bis 24. Mai in Detmold.
Germany, Federal Republic of,
Arbeitsgemeinschaft Getreideforschung eV
Mühle + Mischfuttertechnik **110** (25) 408-409; (29) 464-465 (1973) [De]

Summaries are given of the following papers presented at the conference: Modern methods for protein determination, by H. Bolling; Determination of protein in wheat and flour by the Rapid-Meter, by C. P. Greenwood; Evaluation of enzyme activity in malt flours with synthetic substrates, by J.-M. Brümmer; Studies of methods for determining grain hardness of wheat, by E. K. Meppelink; Nitrosamines in food, by K. Heyns; Observations on the growth of Aspergillus flavus on bread and the formation of aflatoxin, by G. Spicher; Texture of bread and bakery products, by L. Wassermann; Comparative evaluation of physical methods for measuring crumb consistency, by B. Thomas & A. Juretko; Wheat lipids and their enzymic oxidation, by A. Graveland; Enzymic decomposition of protein fractions and detection of fragments by "finger-priting", by H. D. Jodlbauer; and Effect of post-harvest treatment of domestic maize on lipid composition, by H. Bolling, P. Gerstenkorn, A. W. El Baya & H. Zwingelberg. RM

36

[Some observations on the growth of Aspergillus flavus on bread and aflatoxin formation.] Einige Beobachungen über das Wachstum von Aspergillus flavus auf Brot und die Bildung von Aflatoxin.
Spicher, G.
Getreide, Mehl und Brot **27** (10) 320-323 (1973) [De] [Bundesforschungsanstalt für Getreideverarbeitung, Detmold, Federal Republic of Germany]

Bread was artificially infected with spores of Asp. flavus and the spread of the infection and the accompanying formation of aflatoxins

were studied with reference to various conditions. The results showed that growth of Aspergillus on bread is an indication of aflatoxin production. There is no definite correlation between the extent of the mycelium formation and amounts of aflatoxin produced, but the (fairly irregular) accumulation of aflatoxins is restricted to the area visibly occupied by Aspergillus. Amounts of aflatoxin relative to mycelial development are small in the first 3 days after inoculation. Their increase is controlled partly by environmental conditions e.g. temp. and partly by factors connected with the bread, being inhibited by the presence of a rye component, by acidification, by mixed improver or, particularly, by α-calcium propionate. MJD

37

A modified method for aflatoxin determination in spices.
Suzuki, J. I.; Dainius, B.; Kilbuck, J. H.
Journal of Food Science **38** (6) 949-950 (1973) [4 ref. En] [Stange Co., 342 N. Western Ave., Chicago, Illinois 60612, USA]

The usual fluorometric methods for the analysis of aflatoxins are not applicable to many spices because of naturally occurring interfering substances. These substances have been removed successfully by chromatographing on a thin layer of silica gel using a different solvent system in a second dimension, after fixing the aflatoxins with phosphoric acid. The modified method was checked using spices containing known amounts of added aflatoxins. IFT

38

The metabolism of ^{14}C aflatoxins in laying hens.
Sawhney, D. S.; Vadehra, D. V.; Baker, R. C.
Poultry Science **52** (4) 1302-1309 (1973) [20 ref. En] [Dept. of Poultry Sci., Cornell Univ., Ithaca, New York 14850, USA]

Sodium acetate-1-^{14}C labelled aflatoxins were produced by growing Aspergillus flavus strain NRRL-2999 on rice. A single 0.29 µCi oral dose of aflatoxins was administered to laying White Leghorn hens. The radioactivity distribution and its equivalents in various tissues, at 1, 4 and 7 days after the administration of the dose were determined. 7 days after treatment, 70.61% of the dose was recovered in the excrement. The excretion of aflatoxins or their metabolites into the intestine via the bile seemed to be the major pathway by which absorbed aflatoxins were excreted. All the components of eggs laid at various intervals showed ^{14}C activity. Edible parts of the carcass showed varied amounts of ^{14}C aflatoxins and/or their metabolites at all the periods studied. The time necessary to eliminate one-half of the radioactive aflatoxins from the body was found to be 66.82 h. The liver, crop, gizzard and faecal material when fed in the diets were toxic to the duckling. AS

39

Collaborative study of two-dimensional thin layer chromatographic analysis of aflatoxin B_1 in peanut butter extracts, using the antidiagonal spot application technique.
Beljaars, P. R.; Verhülsdonk, C. A. H.; Paulsch, W. E.; Liem, D. H.
Journal of the Association of Official Analytical Chemists **56** (6) 1444-1451 (1973) [14 ref. En] [Food Inspection Service, Florijnruwe 111, Maastricht, Netherlands]

A collaborative study has been carried out among 20 laboratories in The Netherlands, representing governmental and industrial institutes, on the determination of aflatoxin B_1 in peanut butter extracts. Blank peanut butter extracts prepared according to the proposed official Dutch method were spiked with aflatoxin B_1, representing contamination levels of 0, 3, 6, and 12 µg B_1/kg. Samples and standards were spotted on silica gel G TLC plates by the antidiagonal spot application technique described therein. Spotted plates were developed by 2-dimensional TLC with diethyl ether/methanol/water (94:3.5:1.5; lined tank) in the first direction and chloroform/acetone (90:10; unlined tank) in the second direction. Separated B_1 spots from sample and standard developed in both directions were free from background interference. The quantity of aflatoxin B_1 present in the sample was established by visual comparison of the fluorescent intensities of sample and standard B_1 spots. For this procedure the variability of measurements within and between laboratories was statistically investigated: 80-90% of the complete results given by the participants were correct for the blank and spiked extracts (contamination level of 12 µg B_1/kg). [Continued in following abstract.] AS

40

Collaborative study of two-dimensional thin layer chromatographic analysis of aflatoxin B_1 in peanut butter extracts, using the antidiagonal spot application technique.
Beljaars, P. R.; Verhülsdonk, C. A. H.; Paulsch, W. E.; Liem, D. H.
Journal of the Association of Official Analytical Chemists **56** (6) 1444-1451 (1973) [14 ref. En]

[Continued from preceding abstr.] For contamination levels of 3 and 6 µg B_1 B_1/kg an approx. coeff. of variation of 35% was calculated from within- and between-laboratory results. Results obtained in this investigation were compared with those found by previous investigators who used the one-dimensional TLC technique. It is concluded that, with the antidiagonal procedure, small amounts of aflatoxin B_1 (lowest level tested, 3 ppb) may be detected. AS

41

Sensitive cellulose column for the rapid detection of aflatoxins in agricultural products.
Jemmali, M.
Journal of the Association of Official Analytical Chemists 56 (6) 1512-1513 (1973) [5 ref. En] [Service Mycotoxines de l'INRA, 16 rue Nicolas Fortin, 75013 Paris, France]

A simple and rapid screening method has been developed for the detection of <5 parts/billion aflatoxin B_1 in corn. Cellulose tubing is layered with acidic alumina, anhydrous Na_2SO_4, and silica gel. The sample is applied to the column, which is developed in chloroform/acetonitrile/2-propanol. A sharp blue fluorescent band is an indication of the presence of aflatoxin. H_2SO_4 treatment, which will yield a yellow colour in the presence of aflatoxin, may be used as a further confirmatory test. AS

42

[Moulds on bread.] Die Schimmelpilze des Brotes. [Review]
Reiss, J.
Zentralblatt für Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, II 128 (7/8) 685-728 (1973) [87 ref. De, en] [Mikrobiol. Lab. der Grahamhaus Studt KG, Bad Kreuznach, Federal Republic of Germany]

Important morphological and physiological properties of the following bread moulds are given: Alternaria alternata, Aspergillus flavus, Asp. fumigatus, Asp. glaucus group, Asp. nidulans, Asp. niger, Asp. ochraceus, Cladosporium herbarum, Endomycopsis burtonii, Geotrichum candidum, Mucor mucedo, M. pusillus, M. spinosus, Neurospora sitophila, Penicillium crustosum, P. expansum, Rhizopus nigricans and Thamnidium elegans. A key for the determination of the fungi as well as technical advice on the study of bread moulds and details of mycotoxin production are presented. AS

43

Aeration of high moisture corn.
Converse, H. H.; Sauer, D. B.; Hodges, T. O.
Transactions of the ASAE 16 (4) 696-699 (1973) [4 ref. En] [Agric. Eng. Dept., Kansas St. Univ., Manhattan, USA]

Mould growth and other changes occurring during and after delays in the start of cooling and during continuous outdoor aeration of field-shelled corn of 21-22% moisture content were studied. Corn was stored for 20 wk in insulated bins aerated with refrigerated air (about 35°F) (i) immediately after filling, (ii) after 20 h and (iii) after 4 h, and (iv) in an outdoor bin aerated with ambient air immediately. Corn temp., moisture content, and mould growth (% kernels invaded) during the storage period are shown graphically and in tables. Average rates of moisture reduction during 2 seasons were 0.32-0.36%/wk. Essentially no mould growth occurred when corn was cooled immediately. Penicillium spp., Aspergillus flavus and Asp. niger were the principal invading organisms in bins with delayed or no cooling. Max. invasion in delayed cooling occurred during the first few days. In the uncooled bin, invasion was slower, but continued longer to reach higher levels. Aflatoxin levels after 5 months' storage reached 0 ppb (parts/billion) in (i), 50 ppb in (ii), 80 ppb in (iii) and 40 ppb in (iv). Germination of corn from (iv) decreased to 76% and from (i), (ii) and (iii) to >90%. Fat acidity did not consistently reflect temp. or microbiological changes. RM

44

[Contribution of biochemical and biological science to knowledge on fats.]
Desnuelle, P.
Revue Francaise des Corps Gras 20 (12) 683-688 (1973) [Fr, de, en, es] [Univ. d'Aix-Marseille, Aix-en-Provence, France]

The nutritional role of fats is reviewed with reference to organoleptic quality, digestion, utilization for calorie production and as prostaglandin precursors, storage, utilization of press cakes, triglyceride structure, and aflatoxins. RM

45

Method for the determination of aflatoxin M_1 in fluid milk and milk products.
Pons, W. A., Jr.; Cucullu, A. F.; Lee, L. S.
Journal of the Association of Official Analytical Chemists 56 (6) 1431-1436 (1973) [9 ref. En] [S. Regional Res. Lab., USDA, New Orleans, Louisiana 70179, USA]

The method described utilizes acetone/water (77:23) for extraction of M_1 from milk and milk products in a 3-min blender extraction. Phospholipids and soluble proteins in the primary extract are removed by treatment with lead acetate, and residual neutral lipids in the treated extract are removed by pastition into hexane. Aflatoxin M_1 is partitioned into chloroform, which is then washed with salt solution, and the chloroform is evaporated. The residue is dissolved in chloroform, and M_1 is resolved on silica gel-coated plates developed in chloroform/acetone/2-propanol (850:100:50). This basic procedure is applicable to fluid milk and reconstituted freeze-dried milk at levels as low as 0.1 μg M_1/l. Extracts of dried skim-milk, evaporated and condensed milk, and cheese, which require further cleanup before TLC, are purified on a cellulose-aqueous methanol partition column to allow reliable determination of M_1 at levels as low as 0.2 μg/l or kg. Average recovery of M_1 added to fluid milk at levels of 0.1-1.0 μg/l. was 106% without the use of the cleanup column and 90% when the column was used to purify the extracts. Average recovery of M_1 added to other milk products at a level of 0.2 μg/l. or kg was 88%. The precision of the method (coeff. of variation) was estimated to be ±16% at 0.2 μg/l. in fluid milk, and ±4% at a 34 μg/kg level in contaminated freeze-dried milk. AS

46

Method for the determination of aflatoxin in animal tissue.
Brown, N. L.; Nesheim, S.; Stack, M. E.; Ware, G. M.
Journal of the Association of Official Analytical Chemists **56** (6) 1437-1439 (1973) [10 ref. En] [Div. of Chem. & Physics, FDA, Washington, DC 20204, USA]

The method consists of methanol extraction, purification of the extract by transfer from aqueous methanol to chloroform, silica gel column chromatography, partition chromatography on a cellulose-aqueous methanol column, and quantitation by TLC flurodensitometry. Average recoveries of aflatoxins B_1, B_2, G_1, G_2, and M_1 from liver, kidney, heart, and round steak spiked at 0.05, 0.1, and 0.2 µg/kg were 43-123% as measured by TLC fluorodensitometry. The method was successfully applied to the analysis of naturally contaminated liver, kidney, and heart tissues. AS

47

Analysis and survey of ground black, white, and capsicum peppers for aflatoxins.
Scott, P. M.; Kennedy, B. P. C.
Journal of the Association of Official Analytical Chemists **56** (6) 1452-1457 (1973) [26 ref. En] [Food Res. Lab., Health & Welfare Canada, Ottawa, Ontario, K1A OL2]

Reports of contamination of condiments prepared from Piper nigrum (black and white pepper) and Capsicum spp. by toxicogenic strains of Aspergillus flavus pointed to the need for methods of analysis for aflatoxins in these products. Use of 2-dimensional TLC readily allowed the detection of 1.3-2.5 µg aflatoxin B_1, B_2, G_1, or G_2/kg in pepper extracts obtained by AOAC official first action methods for the analysis of aflatoxins in peanuts and peanut products. Approx. % recoveries of the aflatoxins added to the ground pepper at levels of 10-40 µg/kg ranged from 60 to 100%. A survey of 24 ground black and white pepper samples and over 70 capsicum pepper samples for aflatoxins revealed the presence of low concn. (up to about 8 µg aflatoxin B_1/kg) in 3 types of capsicum pepper: ground cayenne pepper (10 of 17 brands), Indian chili powder (6 of 6 brands), and crushed, dried chillies (1 of 1). AS

48

[The importance of food research chemists in environmental protection.] Die Bedeutung des Lebensmittelchemikers aus dem Forschungsbereich für den Umweltschutz.
Fresenius, W.
Deutsche Lebensmittel-Rundschau **70** (1) 13-15 (1974) [14 ref. De] [Inst. Fresenius, Chem. & Biologische Lab. GmbH, 6200 Wiesbaden, Kapellenstrasse 11-15, Federal Republic of Germany]

Problems of the contamination of foods and water with aflatoxins, heavy metals, biocides, nitrosamines and polycyclic aromatic hydrocarbons are discussed, with special reference to sampling methods and analytical techniques. AJDW

49

[Mycological characters of aflatoxin-producing strains belonging to the Aspergillus flavus group. I. A new medium and method for detection of aflatoxin-producing abilities.]
Hara, S.; Murakami, H.; Sugama, S.; Fennel, D. I.; Hesseltine, C. W.
Report of the Research Institute of Brewing [Jozo Shikenjo Hokoku] **145**, 1-7 (1973) [9 ref. Ja, en] [Nat. Res. Inst. of Brewing, Takinogawa, Kita-ku, Tokyo, Japan]

Aflatoxin (AF), produced in plate cultures of AF-producing Asp. flavus, diffused into the agar medium surrounding the colonies and gave blue fluorescence under UV light. Modified Czapek's agar medium containing corn steep liquor (0.05%), $HgCl_2$ (5×10^{-4}M) and $(NH_4)H_2PO_4$ (1.0%), instead of $NaNO_3$, was adopted for cultivation to investigate the blue fluorescence resulting from AF production. A few AF-negative strains also produced weak blue fluorescence in the agar. Therefore, extraction of the blue fluorescent substances by $CHCl_3$ and identification of AF by TLC were required to confirm AF production. YN

50

[Mycological characters of aflatoxin-producing strains belonging to the Aspergillus flavus group. II. Isolation of aflatoxin-producing strains from corn fields in USA.]
Hara, S.; Fennel, D. I.; Hesseltine, C. W.
Report of the Research Institute of Brewing [Jozo Shikenjo Hokoku] **145**, 8-12 (1973) [7 ref. Ja, en]

Of 330 strains of the Asp. flavus group isolated from insects, corn husks and corn kernels, about half produced aflatoxins B_1 and B_2. 1 strain of Asp. toxicarius Murakami was encountered which produced aflatoxins B_1, B_2, G_1 and G_2. YN

51

[Mycological characters of aflatoxin-producing strains belonging to the Aspergillus flavus group. III. Production of mouldy rice containing aflatoxin and sake brewing test with the mouldy rice.]
Hara, S.; Murakami, H.; Ohba, T.; Sugama, S.
Report of the Research Institute of Brewing [Jozo Shikenjo Hokoku] **145**, 13-18 (1973) [9 ref. Ja, en]

Formation of aflatoxin (AF) was greatly inhibited by cultivating the mould at >34°C. Max. AF was produced by cultivation of koji (mouldy rice) at 25-30°C for 10 days. AF formation was

markedly enhanced by addition of corn steep liquor (1.0%) and $HgCl_2$ (10^{-4}) to the cultivation medium. Optimum pH for AF production was 4-5. AF was found in sake prepared from mouldy rice containing AF. YN

52

Aflatoxin analysis.
Jones, B. D.
Alimenta **13** (1) 18 (1974) [11 ref. En] [Tropical Products Inst., 56-62 Gray's Inn Road, London WC1X8LU, UK]

53

[Comparison of the ability to synthesize aflatoxins of various strains of Aspergillus.]
Nakamura, H.; Yokoya, F.
Coletanea do Instituto de Tecnologia de Alimentos **3**, 337-350 (1969/1970) [12 ref. Pt, en]

54

New peanut protein recovery can add to food supply.
Cater, C.
Oil Mill Gazetteer **78** (6) 10-11 (1973) [En]

A technique for chemical inactivation of aflatoxins allows recovery of protein concentrates and isolates suitable for human consumption. The method uses an aqueous 1-step separation of proteins and oil in which comminuted peanuts are extracted with water and the slurry centrifuged into solid, oil and aqueous phases in the presence of water-soluble oxidizing agents which inactivate aflatoxins. By suitable variations in procedure either protein concentrates or isolates can be produced. RM

55

[Deterioration of Brazil nuts. I. Storage of shelled nuts.]
Yokoya, F.; Antunes, A. J.; Jordao, B. A.
Coletanea do Instituto de Tecnologia de Alimentos **3**, 313-323 (1969/1970) [15 ref. Pt, en]

Experiments were conducted to establish the conditions for the safe storage of shelled Brazil nuts. This product could be stored for up to 6 months at 26-28°C and 70% RH, but it deteriorated at 80%. At ≥97% RH, the nuts showed microbial growth on the surface within 2 wk of storage, and developed aflatoxin after 3 months. This meant that they were unsuitable even as animal feedstuff. AS

56

Use of γ-irradiation to prevent aflatoxin production in bread.
Bullerman, L. B.; Barnhart, H. M.; Hartung, T. E.
Journal of Food Science **38** (7) 1238-1240 (1973) [14 ref. En] [Dept. of Food Sci. & Tech., Univ. of Nebraska, Lincoln, 68503, USA]

Irradiation doses of 100 and 200 krad reduced the growth of Asp. parasiticus in bread stored for 10 days at 25°C. With bread stored >2 wk, mould growth in irradiated samples tended to approach the amount which occurred in non-irradiated controls. Mould strain NRRL 3000 seemed slightly more sensitive to irradiation than strain NRRL 2999. A 200 krad dose prevented aflatoxin production by either strain at both high and low levels of inoculation with spores in bread stored for 10 days, except in one case where a very low level of aflatoxins was detected. At 100 krad, bread inoculated with 10^2 spores/slice contained 0 to low concn. of aflatoxins after storage for 10 days, but with 10^6 spores/slice higher amounts of toxins were detected. When the inoculated bread was stored for periods up to 6 wk, the 200 krad treatment prevented aflatoxin production in all bread samples containing 10^2 spores/slice, and in almost all samples containing 10^6 spores/slice. The 100 krad treatment also prevented aflatoxin production during 6 wk of storage in bread that contained 10^2 spores/slice. However, with 10^6 spores/slice both strains were capable of producing very high amounts of aflatoxins after irradiation at 100 krad. At 1, 2 and 6 wk of storage, these amounts were greater than the unirradiated controls, suggesting possible stimulation of aflatoxin production. IFT

57

Environmental contaminants in foods - problems and possible solutions of the seventies.
Somers, E.
Australian Food Manufacture and Distributor **43** (2) 24, 26 28, 33 (1973) [13 ref. En] [Food Div., Food & Drug Directorate, Dept. of Nat. Health & Welfare, Ottawa, Canada]

Environmental contamination is discussed with reference to agricultural technology and the contamination of foodstuffs with pesticides, industrial pollution (heavy metals, Pb etc.) and naturally-occurring contaminants (fungal toxins). Possible solutions to the problem are outlined. VJG

58

A screening medium and method to detect several mycotoxins in mould cultures.
Bullerman, L. B.
Journal of Milk and Food Technology **37** (1) 1-3 (1974) [9 ref. En] [Dept. of Food Sci. and Tech., Univ. of Nebraska, Lincoln, 68503, USA]

A single culture medium consisting of rice

powder (5%), corn steep liquor (4%), and agar (2%) was tested as a substrate for mycotoxin production using 34 known toxinogenic mould strains. Aflatoxins, ochratoxin A, sterigmatocystin, penicillic acid, patulin, citrinin, and zearalenone were each detectable in 4 days of incubation at 25°C using this medium. Extraction of melted agar cultures, in screw cap test tubes, with hot chloroform (55°C) followed by cooling to resolidify the agar greatly facilitated and simplified the extraction process and eliminated the need for separatory funnels. Mycotoxins were detected by treating developed TLC plates with ammonia fumes, p-anisaldehyde, and phenylhydrazine and then viewing the chromatoplates under UV and white lights. AS

59

[Contamination of oleaginous products by mycotoxins, and mycotoxicoses following consumption of these products.] [Lecture]
Lafont, P.
Revue Francaise des Corps Gras **21** (2) 77-84 (1974) [63 ref. Fr, de, en, es] [Lab. de Toxicologie Alimentaire, INSERM, 78-Le Vesinet, France]

This review covers the structure of aflatoxins, toxigenic microorganisms, contamination of vegetable products (groundnut oil and cake, peanut butter, and sunflower and cottonseed cake), mycotoxicoses in farm animals following ingestion of contaminated feed, health hazards in man due to consumption of contaminated oilseeds and products or of products of animals fed contaminated cake, and other mycotoxins. RM

60

[Structure, biological activity and determination of mycotoxins contaminating oleaginous products.] [Lecture]
Frayssinet, C.
Revue Francaise des Corps Gras **21** (2) 85-90 (1974) [19 ref. Fr, de, en, es] [Inst. de Recherche Sci. sur le Cancer, 94800 Villejuif, France]

The structure of the principal mycotoxins (aflatoxins B, G, M and P, sterigmatocystin and ochratoxin), their biological activity and methods of determination are reviewed including biological assays (duckling mortality or hepatic lesions, chick embryos, antibiotic action towards Bacillus megaterium), physico-chemical assay (fluorescence combined with column chromatography and TLC), and a rapid minicolumn method. RM

61

The microbiological safety of food. [Conference proceedings]
Hobbs, B. C.; Christian, J. H. B. (**UK**, International Association of Microbiological Societies)
xv+487pp. ISBN 0 12 350750 2 (1973) [many ref. En]

[Continued from preceding abstr.] Salmonellae in poultry in Great Britain, by J. A. Lee (pp. 197-207, 18 ref.); The occurrence of Salmonellosis in poultry in Denmark 1935-1971 and the eradication programme established, by H. E. Marthedal (pp. 211-228, 9 ref.); Food infection communicated from animal to man, by H. J. Sinell (pp. 229-238, 50 ref.); The origin of pathogens in the live animal in relation to food as part of the zoonoses chain, by N. Skovgaard (pp. 239-245, 2 ref.); Mechanism and prevention of Salmonella infections in animals, by W. Edel, M. van Schothorst, P. A. M. Guinee, & E. H. Kampelmacher (pp. 247-255, 3 ref.); The public health significance of viral infections of food animals, by E. P. Larkin (pp. 257-270, 51 ref.); Staphylococcal food poisoning with special reference to the detection of enterotoxin in food, by R. J. Gilbert & A. A. Wieneke (pp. 273-285, 35 ref.); Enterotoxin detection, by M. S. Bergdoll (pp. 287-292, 9 ref.); Bioassay methods for mycotoxins, by B. Jarvis & M. O. Moss (pp. 293-305, 28 ref.); [Continued in the following abstr.] VJG

62

[Comparison of the ability of various Aspergillus spp. to synthesize aflatoxin.]
Nakamura, H.
Revista Brasileira de Tecnologia **1** (2) 81-86 (1970) [12 ref. Pt, en] [Fac. de Tecnologia de Alimentos, Univ. Estadual de Campinas, SP, Brazil]

63

Mycotoxins produced by fungi isolated from inshell pecans.
Schindler, A. F.; Abadie, A. N.; Gecan, J. S.; Mislivec, P. B.; Brickey, P. M.
Journal of Food Science **39** (1) 213-214 (1974) [14 ref. En] [Div. of Microbiol., FDA, Washington, DC 20204, USA]

Pecans from various sources were examined. Potential mycotoxin producing moulds found were studied for toxin production by growing them on various substrates. Pecan were demonstrated to be suitable for the production of sterigmatocystin, aflatoxin and ochratoxin. The most prevalent mould species recovered, which are also known mycotoxin producers, were Penicillium expansum and Aspergillus versicolor. Also recovered were isolated of Asp. ochraceus, Asp. parasiticus and Asp. sydowi. Approx. 86% of the Asp. versicolor isolates tested produced sterigmatocystin. The single isolate of Asp. parasiticus produced aflatoxin. All other cultures tested failed to produce either patulin, ochratoxin or sterigmatocrystin. IFT

64

Incidence of aflatoxin in southern corn, 1969-1970.
Shotwell, O. L.; Hesseltine, C. W.; Goulden, M. L.
Cereal Science Today **18** (7) 192-195 (1973) [11 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

60 samples of white and yellow corn from all grades except US No. 1 were collected and assayed for aflatoxin. None of the 12 samples of the 1969 crop collected in the south east contained aflatoxin but 14 of 22 samples of the 1970 crop in the same area contained aflatoxin. Corn from that area was infected with southern corn leaf blight in 1970. 4 of the 11 white corn samples contained aflatoxins at levels of 6-141 parts/billion B_1 (2 had >20 parts/billion). The positive samples were US grades 4 and 5 with highest levels in grade 5. 17 of 49 yellow corn samples analysed contained aflatoxins at levels of 4-308 parts/billion B_1, 10 of these had >20 parts/billion B_1. Yellow corn samples with highest levels of aflatoxin were in the poorest grades. Aspergillus flavus was easily isolated from all positive samples. VJG

65

Aflatoxin-associated fluorescence in grain. Its color photography.
Peterson, R. E.; Lillehoj, E. B.
Cereal Science Today **18** (10) 343-344 (1973) [1 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

A method is described by which the UV-induced fluorescence of damaged, aflatoxin-contaminated corn kernels can be photographed, and 2 × 2 colour slides made for viewing or for reproduction as colour prints. Optimum aperture for 1:1 magnification ratio of fluorescent objects was found to be f/32 and flash-to-object distance for daylight pictures was approx. 4 ft. When utilizing an electronic flash as UV source, the short exposure (1/1500 s) prevents image deterioration normally caused by camera movement and gives an excellent depth of field. VJG

66

Mycotoxin-producing potential of moulds isolated from flour and bread.
Bullerman, L. B.; Hartung, T. E.
Cereal Science Today **18** (10) 346-347 (1973) [14 ref. En] [Dept. of Food Sci. & Tech., Univ. of Nebraska, Lincoln, 68503, USA]

Fungal contamination of 3 brands of bleached wheat flour and 3 brands of white and raisin breads stored for different lengths of time was investigated. Representative strains of Aspergillus and Penicillium were isolated from the flour and bread, and screened for their ability to produce mycotoxins (aflatoxins B_1 and G_1, sterigmatocystin, ochratoxin A, penicillic acid, patulin, citrinin and leuteoskyrin). Total mould counts of the flour samples examined ranged from 12 to 500 g. Moulds counts of the bread were very low. 70 moulds were isolated from flour and bread, 16 were classified as Aspergillus spp., 48 as Penicillium spp. and 6 as other genera. 9 strains of Penicillium isolated from flour produced penicillic acid, and 2 produced patulin. None of the Aspergillus spp. produced any of the toxins investigated. 4 Penicillium isolates from bread produced leuteoskyrin. 1 isolate of Aspergillus ochraceus from bread produced both ochratoxin A and penicillic acid. Flour contained more potentially toxic moulds than bread. VJG

67

[Developments in and methods for eliminating aflatoxins from oilseed products (oils and meals).] [Lecture]
Prevot, A.
Revue Francaise des Corps Gras **21** (2) 91-103 (1974) [22 ref. Fr, de, en, es] [Inst. des Corps Gras, Paris, France]

Methods for reducing aflatoxin levels in oilseed products are described including: screening of seeds at reception, at dehulling, or after dehulling; oil refining, especially neutralization and decoloration; detoxication of cakes and meals (solvent extraction: on pilot scale by De Smet, on industrial scale by Lesieur & Speichim methods, ammoniation). De Smet process, with eight 20 min washings with a ternary aezotropic mixture of acetone-hexane-water (485:50:1.5) reduced aflatoxin from 1000 parts/billion (ppb) to 70 ppb but gave disappointing results when scaled up to industrial level by Lesieur-Speichim, reducing levels from 260-470 to 130 ppb and leaving 2-3% residual oil. Treating cake with gaseous NH_3 at 2 bar pressure for 15 min reduced aflatoxin from 600 to 25 ppb but caused some protein denaturation. Total N increased by 1-4% and 13-39% of cystine was destroyed. Other essential amino acids, including available lysine, were not affected. Ammoniation thus seems to be the most promising detoxication method. RM

68

[Aflatoxin M excretion in cows' milk in relation to the quantity of aflatoxin B_1 ingested.] Über die Aflatoxin-M-Ausscheidung in Kuhmilch in Abhängigkeit von der aufgenommenen Aflatoxin-B_1-Menge.
Kiermeier, F.
Milchwissenschaft **28** (11) 683-685 (1973) [12 ref. De, en] [Milchwissenschaftliches Inst. der Tech. Univ. München, Freising-Weihenstephan, Federal Republic of Germany]

4 cows (milk yield, 10-13 l./day) received daily for 5 days 1 kg commercial groundnut meal containing 10.9 mg total aflatoxin/kg (aflatoxin B_1:aflatoxin B_2 ratio, 3.35:1). Excretion of aflatoxin in milk ended on average within 4.5 days after the last intake of the meal; the total aflatoxin excreted amounted to 0.4% of that consumed, the aflatoxin M_1:M_2 ratio in milk being the same as for B_1 and B_2 in the groundnut. Max. concn. in milk (for each cow this being in the 1st milking after

cessation of groundnut feeding) ranged from 1.0 to 2.3 μg/l. In a 2nd experiment, cows received pure B_1 aflatoxin as a 50-mg capsule on 3 consecutive days. Total aflatoxin M_2 excretion over 14 days amounted on average to 0.80%, with max. level being 40 μg/l. milk; 90% of the dose was excreted by the end of the 1st after cessation of dosing, and the remaining 10% was excreted over the next 8-9 days. In the experiment, not only M_1 but also B_1 aflatoxin was excreted. SKK

69

Behaviour of aflatoxins in some meat products.
Strzelecki, E. L.
Acta Microbiologica Polonica, B 5 (4) 171-177 (1973) [8 ref. En] [Vet. Hygiene Res. Sta., 80-316 Gdansk, Poland]

Aspergillus flavus can grow and produce aflatoxins in country cured ham (traces after 84 and 126 days of storage at 5° and 30.1°) and in salami (104.85 and 213.40 μg/100 g after 13 and 78 days of storage at various temp.). The recovery of added aflatoxins during the storage of meat products was: 16% in raw ham after 6 wk, 7% in country cured ham after 126 days, and 19% in salami after 78 days. Some chemicals like p-aminobenzoic acid, potassium sulphite, and potassium fluoride inhibited aflatoxin synthesis in salami (0.12 to 1.08 μg/100 g after 13 and 78 days of storage). Of curing ingredients, aflatoxin production was totally inhibited by potassium nitrate. Sodium nitrite stimulated their formation a little but the curing mixture was the best stimulator (242.5 μg vs. 0.12 μg/100 ml in control medium). Twice as much aflatoxin G_1 as B_1 (150.0 μg and 75.0 μg/100 ml, respectively) was found in the mixture. Asp. ochraceus inhibited the production of aflatoxins but Penicillium miczynski Zaleski stimulated their formation (4.79 μg and 258.0 μg/100 ml, respectively). A mixture of some specific mould strains inhibited formation of aflatoxins (0.93 μg/100 ml). AS

70

[Moulds and fungi as causes of spoilage in foods.]
Schimmelpilze und Hefen als Verderbniserreger von Lebensmitteln.
Knöpfel, H. P. (**Switzerland**, Schweizerische Gesellschaft für Lebensmittelhygiene)
Schweizer Brauerei-Rundschau 85 (1) 17-20 (1974) [De] [Versuchssta. Schweizerischer Brauereien, Zürich, Switzerland]

Abstracts are given of the following papers which were presented at the 6th working conference of the Schweizerische Gesellschaft für Lebensmittelhygiene, held on 2 Nov. 1973 in Rüschlikon, Switzerland: What are moulds and yeasts?, by E. Müller; Toxic metabolites from moulds, by H. K. Frank; Moulds and yeasts as causes of spoilage in beverages by H. U. Daepp; Pathogenic yeasts and moulds in foods and feeds, by H. Rieth; Moulds in cereals, by G. Spicher; and

71

The effects of ^{60}Co irradiation on aflatoxin production by Aspergillus flavus grown on wheat and a synthetic medium.
Applegate, K. L.
Dissertation Abstracts International, B 33 (8) 3802: Order no. 73-1927 (1973) [En] [Ohio St. Univ., 190 North Oval Drive, Columbus, 43210, USA]

Asp. flavus NRRL-A-12268 and Asp. flavus NRRL-3145 spores were exposed to ionizing radiation doses of 25-600 krad, inoculated on sterilized wheat and Czapek's medium, and incubated at 28°C in a 98 ± 2% RH chamber for up to 10 days. Samples were removed at daily intervals and analysed for aflatoxins B_1, B_2, G_1, and G_2. Exposure of Asp. flavus NRRL-A-12268 (non-toxinogenic strain) spores to radiation did not induce aflatoxin production on wheat or synthetic medium. Exposure of Asp. flavus NRRL-3145 (toxinogenic strain) spores to 50-300 krad produced, in wheat and synthetic medium, larger amounts of aflatoxin than non-irradiated cultures. Most notable increases in aflatoxin production occurred with 200 krad radiation and incubation for 7 days. 400 krad completely inhibited spore germination in wheat and Czapek's medium which consequently inhibited aflatoxin production. Of the 4 aflatoxins studied, B_1 was produced in amounts equal to or greater than those of G_1. B_2 and G_2 were produced in significantly smaller quantities. Cultures on wheat produced greater amounts of aflatoxin than similarly treated cultures on Czapek's medium. JA

72

Tissue distribution of aflatoxin B_1-^{14}C in layer and broiler chickens.
Mabee, M. S.
Dissertation Abstracts International, B 33 (8) 3817: Order no. 73-2059 (1973) [En] [Ohio St. Univ., 190 North Oval Drive, Columbus, 43210, USA]

0.1 ppm (body wt. basis) aflatoxin B_1-^{14}C or an unlabelled control was administered to Leghorn pullets and broiler-type chickens by crop intubation daily for 14 days. Faeces and eggs were collected at 2 and 1 day intervals, respectively, during this period. 5 h after the final dose, the birds were killed by exsanguination, and tissues and organs removed for analysis. Faeces, eggs, blood, leg muscle, breast muscle, heart, liver and gizzard were assayed for radioactivity by liquid scintillation spectrometry. Layer chickens and broilers excreted 64.5 and 62.5%, respectively, of the ^{14}C administered in the final 3 doses. 35.5 and 37.9%, respectively for layers and broilers, of ^{14}C administered in the final 3 doses were detected in the blood, liver, heart, gizzard, breast muscle and leg muscle. None was detected in the eggs. Results indicated that aflatoxin M_1-^{14}C glucuronides constitute a significant portion of the radioactive water-soluble conjugates isolated from edible chicken parts. JA

73

[Toxic effects of various mycotoxins on silk worm (Bombyx mori L.) larvae in ad libitum feeding tests.]
Murakoshi, S.; Ohotomo, T.; Kurata, H.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] 14 (1) 65-68 (1973) [8 ref. Ja, en] [Kanagawa Prefecture Inst. for Sericultural Sci., Nakashinden, Ebina-shi, Kanagawa-ken]

Toxic effects of 9 mycotoxins (including aflatoxins B_1 and G_1 and ochratoxin A) on silkworm larvae were determined in feeding trials. Results indicate that silkworm larvae would be useful agents for the bioassay of mycotoxins. TM

74

Proceedings of the 6th International Symposium of W.A.V.F.H., Elsinore, Denmark, 20-24th August, 1973. [Symposium]
World Association of Veterinary Food-Hygienists 2nd edition 190pp. (1973) [many ref. En, De, Fr]

[Continued from preceding abstr.] Is there any evidence of mycotoxins in foodstuffs of animal origin being a health hazard to man?, by P. Krogh (3pp., 7 ref., En); Comparative investigations on various media containing D-cycloserine for cultivation of clostridia, by J. Takacs & Z. E. Imreh (2pp., En); Distribution of Clostridium botulinum in Danish trout farms. Measures to reduce the contamination of fish before slaughter, by H. H. Huss & A. Pedersen (2pp., 5 ref., En); Behaviour and epidemiological significance of enteropathogenic organisms in surface waters, by J. Borneff (8pp., 30 ref., De); The "minimum acceptable standards" for foods, by C. Ienistea (6pp., 24 ref., Fr); Gastroenteric disorders in travelling, by E. H. Kampelmacher (2pp., En); Preventive measures against food-borne diseases in international tourism, by S. Kendereski (1p., En); The role of recipient body of water in the epidemiological cycle of enteric pathogens, by K. K. Kristensen (5pp., En); International hygiene standards for foods: are they to protect the consumer or are they simply another form of trade restriction? An analysis of a scientific-political dilemma, as illustrated by the EEC guidelines on fresh meat, by K. Gerigk (7pp., De); Barriers in international meat trade - are they necessary?, by A. Ginsberg (10pp., 3 ref., En); Problems concerning disease recording at meat inspection, by U. Biering-Sorensen (4pp., En).
HBr

75

Aflatoxin. Mould types, criteria, toxicity, detoxification, standards, chemical and biological detection. [Review]
Waart, J. de; Zadelhoff, C. van; Edelbrock, A.
Alimenta 13 (2) 35-43 (1974) [125 ref. En] [Central Inst. for Nutr. & Food Res. TNO, Zeist, Netherlands]

Main producers of aflatoxin, conditions for and criteria of production, distribution of moulds and toxin, toxicity to various animals, sensitivity to various aflatoxin types, clinical effects, bioassays, and chemical and biological detoxification are reviewed. WHO, USA/Canada, Japan and Netherlands permitted maxima, and available aflatoxin standards are listed. Methods for detection and determination are described in detail including Soxhlet extraction, methanol method and column cleaning method. All 3 methods use 2-dimensional TLC as the final step. RM

76

Aflatoxin: its analysis, production, and biosynthesis.
Shih, C.-N.
Dissertation Abstracts International, B 33 (7) 3218-3219: Order no. 72-23335 (1973) [En] [Univ. of Wisconsin, Madison 6, USA]

A method involving extraction of aflatoxin with chloroform/methanol/water mixture and purification with methanol/water/hexane recovered >90% of added aflatoxin from food samples in approx. 1 h. Aflatoxins were not detected in 10 commercial mould-ripened cheese samples including Blue, Roquefort and Camembert cheeses. Aspergillus parasiticus and, to a lesser extent, Asp. flavus produced aflatoxin at 23.9° but not at 7.2°C when grown on the surface of Brick cheeses [see FSTA (1973) 5 3P392]. Toxin production was enhanced by 1-2% NaCl but suppressed by higher concn. [see FSTA (1973) 5 1C17]. A close relationship existed between patterns of synthesis of aflatoxin and of total lipid, and it is suggested that they may share a similar pathway involving synthesis of polyacetate. CDP

77

[Detection of aflatoxin in wine.] Zum Nachweis von Aflatoxinen in Wein.
Drawert, F.; Barton, H.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 154 (4) 223-224 (1974) [8 ref. De, en] [Inst. für Chem.-tech. Analyse und chem. Lebensmitteltech., Freising-Weihenstephan, Federal Republic of Germany]

The wine is extracted by concn. in a rotary evaporator, shaking with chloroform, drying the chloroform phase over Na_2SO_4, and solution of the residue in benzene/acetonitrile. The extract is analysed by TLC on Kieselgel 60 F_{254} (Merck) in direct UV light at 366 nm. Analysis of 17 Rheinpfalz wines (1967, 1970 and 1971), made primarily from grapes susceptible to fungal disease and hence to the occurrence of aflatoxins, showed no signs of aflatoxins. Limits of detection are 0.05 µg/l. wine. HBr

78

[Deterioration of Brazil nuts. I. Storage of shelled nuts.]
Yokoya, F.; Jose Antunes, A.; Antonio Jordao, B.
Revista Brasileira de Tecnologia **1** (1) 17-21 (1970) [15 ref. Pt, en] [Inst. de Tecnologia de Alimentos, Caixa Postal 655, Campinas, SP, Brazil]

Experiments were conducted to find conditions for safe storage of shelled Brazil nuts. This product could be stored for as long as 6 months at 26-28°C and 70% RH but it deteriorated at 80%. At 97% RH or higher, the nuts showed microbial growth on their surface within 2 wk of storage and developed aflatoxin after 3 months. This indicated that nuts showing signs of spoilage were unsuitable for consumption even as animal feed. AS

79

Mycotoxin formation affected by fumigation of wheat.
Vandegraft, E. E.; Shotwell, O. L.; Smith, M. L.; Hesseltine, C. W.
Cereal Science Today 18 (12) 412-414 (1973) [10 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

Samples of hard red winter wheat were fumigated with (i) methyl bromide (2 lb/1000 ft^3, 24 h), (ii) 0,0-dimethyl 0-(2,2-dichlorovinyl) phosphate (20 ppm, 1 wk), (iii) ethylene dichloride: carbon tetrachloride (75:25 w/w) (3 gal/1000 bushels, 12 h) and (iv) chloropicrin (2 lb/1000 bushels, 48 h), aerated and stored in metal containers at 0°C for 2 wk before inoculation with Aspergillus flavus (4 strains), Asp. parasiticus (2 strains)m Asp. ochraceus and Penicillium viridicatum. Half the fumigated and nonfumigated wheats were sterilized by autoclaving at about 25% moisture before inoculation. Of the 8 fungal strains used, 6 were affected by (i), 5 by (ii), 4 by (iii) and 1 by (iv). Asp. parasiticus and Asp. flavus strains produced aflatoxin and Asp. ochraceus and P. viridicatum produced ochratoxin. Yields of aflatoxin were higher on sterilized than unsterilized wheat. Ochratoxin production was little affected by sterilization. Fumigation both increased and decreased aflatoxin and ochratoxin production, depending on the fungal strain with which the wheat had been inoculated. VJG

80

[Harmful compounds in cereals - a problem of consumer protection.] Schadstoffe in Getreide - ein Problem des Verbraucherschutzes. [Lecture]
Seibel, W.; Ocker, H. D.
Mühle + Mischfuttertechnik **111** (11) 163-166 (1974) [11 ref. De] [Bundesforschungsanstalt für Getreideverarbeitung, Detmold, Federal Republic of Germany]

Max. permitted levels, origins, occurrence, effects of processing, and alternatives to using harmful compounds in cereals and cereal products are discussed. Harmful substances include radioactive compounds, heavy metals (e.g. As, Pb, Cd, Hg), carcinogenic hydrocarbons (e.g. benzpyrene), mycotoxins, and residues of pesticides and preservatives. While processing (hulling, milling) reduces levels in flour by 50-80%, it enriches by-products which may be used in animal feed. Alternative methods are recommended which would reduce the level of contamination e.g. using non-persistent pesticides instead of persistent ones. RM

81

[Detection of aflatoxin in meat products.] Zum Nachweis von Aflatoxin in Fleischwaren.
El-Nawawy, F. A.
Wiener Tierärztliche Monatsschrift 61 (2) 66-68 (1974) [20 ref. De, en] [Inst. für Fleischhygiene, Fleischtech. und Lebensmittelkunde, Tierärztliche Hochschule, Vienna, Austria]

A method for extraction and determination of aflatoxins in meat products is described. A chloroform extract of the meat sample is filtered, and purified on a kieselgel-Na_2SO_4 column; fats and other interfering substances are first eluted with hexane and water-free diethyl ether, after which the aflatoxins are eluted with chloroform/methanol (97:3). The aflatoxin-containing eluate is then concentrated, and separated by TLC on kieselgel plates using a chloroform/acetone (19:1) solvent system. Aflatoxin concn. is evaluated by a UV fluorescence method. The detection limit of the method is 2 ppb. No aflatoxins were detected in studies on 45 samples of various meat products. AJDW

82

[Aflatoxins in food products.]
Sutic, M.; Stojanovic, M.
Hrana i Ishrana 14 (1/2) 84-92 (1973) [53 ref. Sh, en] [Poljoprivredni Fak., Lab. za Mikrobiol. Belgrade-Zemun, Yugoslavia]

The toxic and carcinogenic effects of aflatoxins are discussed, with reference to occurrence of aflatoxins in milk, cheese, meat, ham, sausages, vegetables, fruit and cereals. Methods of determination of aflatoxins are also discussed, and the inclusion of aflatoxin determination in food quality evaluation schemes in Yugoslavia is recommended. IN

83

Scale-up of AOAC method III for quantitation and isolation of aflatoxins in nuts and nut products for chemical and biological confirmation.
DiProssimo, V. P.
Journal of the Association of Official Analytical Chemists 57 (2) 349-352 (1974) [10 ref. En] [Food & Drug Administration, 850 Third Avenue, Brooklyn, New York 11232, USA]

The official AOAC Method III for aflatoxins in peanuts and peanut products (Best Foods or BF method) [Official Methods of Analysis (1970) 11th Ed., AOAC, secs. 26.025-26.030 and Journal of the Association of Official Analytical Chemists (1968) **51**, 67-73] has been adapted to a larger sample size (500 g), approaching the sample handling capacity of the 1 kg official AOAC Method I (FDA Contaminants Branch or CB method) [Official Methods of Analysis (1970) 11th Ed., AOAC, secs. 26.015-26.020 and FSTA (1970) **2** 5J539]. The modified procedure (NY method) was used in place of the 1 kg CB method for obtaining quantitative assay results and for isolation of pure aflatoxin B_1 for derivatization and bioassay. Two samples of naturally contaminated unshelled pistachio nuts and 4 peanut product samples were analysed using the modified NY method and the results were compared with quantitative assays using official methods. Results were in excellent agreement with the official methods. The TLC pure alfatoxin B_1 recovered using the modified procedure on various products was 39-75% of that calculated to be present in the samples, a favourable recovery compared to the 1 kg CB method (usually about 50%). All derivatizations carried out were successful (3 samples) and all biological confirmations were successful (2 samples were tested by the chick embryo bioassay for aflatoxin B_1 toxicity). AS

84

Effect of foliar fungicides on aflatoxin, oil and protein content and maturing rate of peanut kernels.
Beuchat, L. R.; Smith, D. H.; Young, C. T.
***Journal of the Science of Food and Agriculture* 25** (5) 477-482 (1974) [15 ref. En] [Dept. of Food Sci., Univ. of Georgia Agric. Expt. Sta., Experiment, 30212, USA]

Arachis hypogaea L. 'Tifspan' and 'Florunder' peanuts (groundnuts) were treated with selected foliar fungicides for control of Cercospora leafspot. Peanut fruits were harvested on 3 different dates and analysed for aflatoxin, oil and protein content and degree of maturity. No significant differences ($P = <0.05$) in aflatoxin incidence were associated with either fungicide treatments or harvest dates. Significant differences were observed, however, in the % protein and oil content of the peanut kernels, depending upon the fungicide treatment. Delayed maturity was caused by specific fungicide treatments. AS

85

Aflatoxins in foods and feedstuffs. I. A fluorescence micro-method for determination of aflatoxins in solution.
Chelkowski, J.; Godlewska, B.; Kokorniak, M.; Szebiotko, K.; Wiewiorowska, M.
***Nahrung* 18** (1) 19-25 (1974) [6 ref. En, de, ru] [Inst. of Food Tech. of Plant Origin, Agric. Acad., Poznan, Poland]

A method for detn. of aflatoxins is described. Samples of aflatoxin extract (containing ≥0.5 µg aflatoxin) are separated by TLC on silica gel, aflatoxin spots are separated, the aflatoxin is eluted with methanol and the silica gel is separated by centrifugation. Fluorescence measurements are then taken at 430-436 nm, using light of wavelength 365 nm for excitation. Detection limit is 0.1 µg for aflatoxins B_1 and G_1 and 0.01 µg for aflatoxins B_2 and G_2. Aflatoxins B_1 and G_1 were found to be highly light sensitive, forming strongly fluorescent photodecomposition products. Results of the fluorescence micro-method agreed closely with results of spectrophotometric, fluorodensitometric and visual detn. [See also following abstr.] AJDW

86

Aflatoxins in food and feedstuffs. II. Determination of the aflatoxin B_1, B_2, G_1 and G_2 contents in grain crops.
Janicki, J.; Szebiotko, K.; Kokorniak, M.; Wiewiorowska, M.; Chelkowski, J.; Godlewska, B.
***Nahrung* 18** (1) 27-37 (1974) [22 ref. En, de, ru]

A method for detn. of low concn. (5-10 µg/kg) of aflatoxins in grain (wheat, barley, rye and oats) is described, with reference to the pre-extraction, extraction, concn., column-chromatographic clean-up and TLC conditions for each type of grain. Details are given of fluorodensitometric detn. of aflatoxins after TLC separation. Studies were conducted on the suitability of various silica gel preparations and solvent systems for TLC of aflatoxins; results are discussed in detail. Confirmatory tests for aflatoxins are also briefly discussed. Aflatoxins (30 µg/kg) were found in only 1 of 40 samples of mouldy stored wheat. [See also preceding and following abstr.] AJDW

87

Aflatoxins in food and feedstuffs. III. Fluorodensitometric method for determination of aflatoxins M_1 and M_2 in presence of aflatoxins B_1, B_2, G_1 and G_2.
Szebiotko, K.; Chelkowski, J.; Kokorniak, M.; Socalska, W.; Wiewiorowska, M.
***Nahrung* 18** (2) 185-193 (1974) [10 ref. En, de, ru]

Details are given of a method for TLC separation and fluorodensitometric detn. of aflatoxins M_1 and M_2 in the presence of aflatoxins B_1, B_2, G_1 and G_2. Of several TLC gels and solvent systems tested, the best results were obtained with Adsorbosil-1 gel and a benzene/ethanol/water (46:35:19) solvent system; this gave almost total separation of the aflatoxins. Details are given of the fluorescence properties of aflatoxins M_1 and M_2, extraction methods, confirmatory tests, and biosynthesis of aflatoxins M_1 and M_2 by Aspergillus flavus and Asp parasiticus. No aflatoxins were detected in samples of dried milk from 3 factories in Poland. [See also preceding abstr.] AJDW

88

Metabolism and tissue distribution of aflatoxin B_1-^{14}C in layer and broiler chickens.
Mabee, M. S.; Chipley, J. R.
Abstracts of the Annual Meeting of the American Society for Microbiology 73, 21 (1973) [En]
[Ohio St. Univ., Columbus, USA]

Effects of administering low levels of aflatoxin B_1-^{14}C by crop intubation daily for 14 days to broiler and layer chickens were determined. Studies on distribution of ^{14}C in blood, selected organs, tissues, and excreta were conducted. Chemical analysis was performed on those substrates where radioactivity (^{14}C) was observed. No toxic effects were observed in chickens during the course of the experiment and post-mortem examinations revealed no gross evidence of pathology. Broiler chickens excreted 91% of the ^{14}C administered. Of the ^{14}C retained, 11, 10, 4, 13, 32, and 31% were detected in the blood, liver, heart, gizzard, breast, and leg, respectively. Layer chickens excreted 92% of the ^{14}C administered. Of the ^{14}C retained, 20, 16, 4, 7, 26, and 27% were detected in the blood, liver, heart, gizzard, breast, and leg, respectively. No radioactivity was detected in eggs. Chemical assay of radioactive samples revealed that 81% of the radioactivity was soluble in aqueous extracts while 10% was extractable by classical extraction procedures. Treatment of aqueous extracts for conjugated steroids with beta-glucuronidase revealed that 32% of the ^{14}C detected in the aqueous extract was a liberated glucuronide conjugate of aflatoxin M_1-^{14}C. AS

89

Increased aflatoxin production by Aspergillus flavus following ^{60}Co irradiation.
Applegate, K. L.; Chipley, J. R.
Abstracts of the Annual Meeting of the American Society for Microbiology 73, 21 (1973) [En]
[Ohio St. Univ., Columbus, USA]

Spores of Asp. flavus NRRL-3145 were subjected to irradiation levels of 25-600 krad, at a dose rate of 10.2 krad/min. Irradiated spores of known concn. were inoculated into a synthetic liquid medium and onto a cracked wheat substrate. 3 replications consisting of daily productions of the irradiation-induced aflatoxins were quantitatively determined from day 1 through day 10 via TLC and spectrophotometry. No significant difference was observed in toxin production between controls and spores receiving 25 krad. Irradiation levels of 400 and 600 krad resulted in complete inhibition of spore germination. Increases in B toxin occurred at 300 krad by Asp. flavus cultures developing on the wheat substrate. Exposures to 150 and 200 krad increased B_1 production in both the wheat and synthetic media. More B_2 toxin was produced in the synthetic medium following 150 and 200 krad exposures than was produced by either the non-irradiated controls or by similarly treated spores developing on the wheat substrate. Analysis of variance revealed that substrate, time of incubation following the respective irradiation doses, as well as irradiation levels, all affected the quantities of aflatoxin produced by this organism. AS

90

[Influence of the solvent on the fluorescence of aflatoxin B_1.] Einfluss des Lösungsmittels auf die Fluorescenz von Aflatoxin B_1.
Kiermeier, F.; Kroczek, S.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 154 (5) 288-290 (1974) [6 ref. De, en] [Milchwissenschaftliches Inst., Weihenstephan, Federal Republic of Germany]

Fluorescence excitation and emission maxima are tabulated for aflatoxin B_1 in chloroform, acetonitrile, water, methanol, ethanol and 1- and 2-propanols. Fluorescence intensity was highest with alcohols (in the order, propanols > ethanol > methanol) and lowest with chloroform and acetonitrile. SKK

91

Formation of aflatoxin in grapefruit substrates.
Alderman, G. G.; Marth, E. H.
Abstracts of the Annual Meeting of the American Society for Microbiology 72, 28 (1972) [En]
[Univ. of Wisconsin, Madison, USA]

Fresh grapefruit juice (GJ) and peel were inoculated with an aflatoxinogenic strain of Aspergillus flavus or Asp. parasiticus and incubated at 28°C for ≥62 days. Aflatoxins appeared in both substrates after 2 days. In GJ, aflatoxin B_1 (Asp. flavus) concn. increased for 1 month, then decreased and levelled off; concn. of aflatoxin G_1 increased for 18 days (Asp. flavus) and for 54 days (Asp. parasiticus); concn. of aflatoxins B_2 and G_2 failed to increase during extended incubation; and pH increased from 3.1 at 2 days to 9.1 at 62 days. When moulds were grown on peel, concn. of B_1 and G_1 were 10 times higher than in juice (5.9 µg B_1/g versus 0.59 µg B_1/ml); concn. of B_1 either increased for 16-18 days and levelled off (Asp. flavus) or increased rapidly early during incubation and then remained constant through an extended holding period (Asp. parasiticus); concn. of G_1 either increased for up to 34 days and levelled off (Asp. parasiticus) or failed to increase over the amount formed early in the incubation period; concn. of B_2 and G_2 were lower than those of B_1 and G_1 and, in some instances, also increased during extended incubation. Both moulds were grown in GJ for 14 days at 28°C after which the GJ was separated into 3 fractions. Solids contained 0.47, filtrate 0.06, and mould 0.19 µg B_1/g or ml. AS

92

Mycotoxin potential of mold flora from dried beans.
Mislivec, P. B.; Dieter, C. T.; Sanders, A. C.
Abstracts of the Annual Meeting of the American Society for Microbiology 73, 20 (1973) [En] [FDA, Washington, DC, USA]

The mould flora of 75 samples of dried beans was determined. Samples, collected from warehouses, were plated on malt agar containing 7.5% NaCl, and incubated for 14 days at room temp. prior to mould speciation. The flora which dominated was Aspergillus glaucus, Asp. ochraceus, Penicillium cyclopium, P. viridicatum, plus species of Cladosporium and Alternaria. The toxic species, Asp. versicolor, Asp. flavus, Penicillium citrinum, and P. urticae occurred regularly, but in low %. When 100 isolates of toxic species were grown on sterile rice substrate at room temp., 7 different mycotoxins were produced: Asp. flavus - aflatoxins; Asp. versicolor - sterigmatocystin; Asp. ochraceus - ochratoxins; P. urticae - patulin and griseofulvin; P. citrinum - citrinin; P. cyclopium - penicillic acid; P. viridicatum - penicillic acid and citrinin. AS

93

[Toxic materials in cereals - a consumer protection problem.] Schadstoffe im Getreide - ein Problem des Verbraucherschutzes.
Seibel, W.; Ocker, H. D.
Deutsche Müller-Zeitung 72 (9) 157-160 (1974) [11 ref. De] [Bundesforschungsanstalt für Getreideverarbeitung, Detmold, Federal Republic of Germany]

Contamination of cereals and cereal products (bread, flour and bakery products) with pesticides, fumigants, heavy metals, radioactive materials, carcinogenic hydrocyrbons and mycotoxin is discussed, with reference to: legislation in the Federal Republic of Germany; sources and incidence of contamination; reduction of the concn. of contaminants during processing (aspiration, washing, husking and milling); problems of use of contaminant-enriched by-products, e.g. bran, in animal feeds; and prospects for reduction of the level of contamination of cereals. AJDW

94

Toxic molds in black and white peppercorns.
Mislivec, P. B.; Douglas, R. G., Kautter, D. A.
Abstracts of the Annual Meeting of the American Society for Microbiology 72, 27 (1972) [En] [FDA, Washington, DC, USA]

Mycotoxic moulds in 24 white and [illegible] black imported lots of peppercorns [illegible] For each sample, [illegible] and 100 peppercorns [illegible] dextrose agars. 73% of nondisinfected black peppercorns contained mould while only 12.3% of disinfected black peppercorns contained mould, indicating surface contamination. Aspergillus glaucus predominated both before and after disinfection. Other species occurring were: Asp. flavus, Asp. niger, Asp. tamarii, Asp. sydowi, Asp. versicolor, Asp. ochraceus, Asp. fumigatus. 100% of white peppercorns, both before and after disinfection, contained mould, indicating internal contamination. Asp. niger, Asp. tamarii, Asp. versicolor and Penicillium islandicum predominated before disinfection, while Asp. versicolor, Asp. flavus, Asp. sydowi and P. citrinum predominated after disinfection. Asp. glaucus was rare in white peppercorns. Isolates of the following produced mycotoxins on sterile rice: Asp. flavus, Asp. ochraceus, Asp. versicolor and P. citrinum. AS

95

Ammoniation of aflatoxin B_1: isolation and identification of the major reaction product.
Lee, L. S.; Stanley, J. B.; Cucullu, A. F.; Pons, W. A., Jr.; Goldblatt, L. A.
Journal of the Association of Official Analytical Chemists 57 (3) 626-631 (1974) [14 ref. En] [S. Regional Res. Center, USDA, New Orleans, Louisiana 70179, USA]

The major product formed from reacting pure aflatoxin B_1 with NH_4OH at 100°C under pressure was isolated in crystalline form. The compound, mol. wt. 286 (mass spectra), ultraviolet (UV) absorption, λ (max., methanol) 227, 324 nm (ε 15 920, 12 440), is nonfluorescent, exhibits phenolic properties, and lacks the lactone group characteristic of aflatoxin B_1. Acidification of the compound did not regenerate aflatoxin B_1. Calculations made from UV absorption spectra indicate that this mol. wt. 286 compound comprises about 30% of the crude ammoniation product. It is postulated that the new product, $C_{16}H_{14}O_5$, arises from opening the lactone ring of aflatoxin B_1 during ammoniation, formation of the ammonium salt of the resultant hydroxy acid, and loss of CO_2 from this β-keto acid. Because this compound arises from decarboxylation, the trivial name aflatoxin D_1 is proposed. Aflatoxin D_1 was detected in the chloroform extract of a highly contaminated ammoniated groundnut meal. AS

96

[Use of the Stomacher for mycotoxin analysis.] Einsatz des "Stomacher" in der Mykotoxin-Analytik.
Lötzsch, R.; Tauchmann, F.; Meyer, W.
Fleischwirtschaft 54 (5) 943-945 (1974) [8 ref. De, en] [Bundesanstalt fur Fleischforschung, 8650 Kulmbach, Blaich 4, Federal Republic of Germany]

Use of the Stomacher (Seward & Co. Ltd., London SE1) for homogenizing and extracting [illegible]

birds fed aflatoxin-containing diet, homogenized with the Stomacher or the Waring Blendor and extracted by the AOAC method, produced statistically the same yield of aflatoxin B_1, and 60-80% recovery of added aflatoxin, with a sensitivity 0.1 part/billion, irrespective of homogenization method. When the Stomacher was used for simultaneous homogenization and extraction, significantly less aflatoxin ($P < 5\%$) was obtained from tissue samples, though not from eggs ($P > 5\%$), suggesting intracellular binding of aflatoxin. For examination of tissues, the Stomacher can be used in combination with extraction; for eggs and egg powder it can be used simultaneously for both processes. RM

97

[Use of proteolytic enzyme preparations for protein stabilization of wines.]
Bulancea, M.
Industria Alimentara 25 (4) 181-183 (1974) [14 ref. Ro, en, fr, de, ru] [Inst. Politehnic, Galati, Rumania]

Musts and wines made from Wälschriesling and Muscat Ottonel grapes of the 1970 harvest and Feteasca Alba and Muscat Ottonel grapes of the 1972 harvest (musts sulphited at 100 mg SO_2/l. before fermentation with Saccharomyces ellipsoideus) were used in these tests. An enzymic preparation from Aspergillus niger was added at 0.0005, 0.001 or 0.005% to must samples; and at 0.001% to the 1972 harvest wine samples, which were held at 20°, 30°, or 40°C and examined after 6, 24 and 48 h. It is concluded from results tabulated for contents of total and amino N and protein and (for wine) results of the tannin test that must treatment (at the 2 higher enzyme concn.) caused appreciable (30-40%) hydrolysis of must proteins, without, however, ensuring the necessary protein stability in the resultant wines; and that treatment of wines at 20°C did not give satisfactory results. Treatment at 30° and, particularly, at 40°C was much more efficacious, but use of such temp. is inadmissible in practice. Development of enzyme preparations of high activity at practical temp. and conditions for musts and wines is recommended; and potential aflatoxin dangers of Asp. niger preparations is pointed out. SKK

98

Variability of aflatoxin test results.
Whitaker, T. B.; Dickens, J. W.
Journal of the American Oil Chemists' Society 51 (5) 214-218 (1974) [9 ref. En] [N. Carolina St. Univ., Raleigh, 27607, USA]

Using 12 lb samples of peanuts, 280 g subsamples, the Waltking method of analysis, and densitometric procedures, the sampling, subsampling, and analytical variances associated with aflatoxin test procedures were estimated. Regression analysis indicated that each of the above variance components is a function of the content of aflatoxin in the population being tested. Results, for the test procedures given above, showed that sampling constitutes the greatest single source of error, followed by subsampling and analysis. Functional relationships are presented to determine the sampling, subsampling, and analytical variance for any size sample, subsample, and number of analyses. AS

99

[Aflatoxins in groundnuts.]
Jodral Villarejo, M.
Archivos de Zootecnia 23 (89) 1-8 (1974) [17 ref. Es, en] [Catedra de Bromatologia y Microbiol. de los Alimentos, Fac. de Vet., Cordoba, Spain]

25 samples of packaged, shelled but unhusked roasted, salted peanuts purchased at random in Cordoba shops, were examined. 1 sample was found to contain aflatoxin B_1, the content being calculated at 50 µg/kg. Aflatoxin M_1, was also qualitatively detected [in 1 sample ?]. SKK

100

[Report on the Cereal Chemistry Conference, 22-24 May 1973.] Bericht über die Getreidechemiker-Tagung vom 22.-24. Mai 1973.
Germany, Federal Republic of, Arbeitsgemeinschaft Getreideforschung eV (Wassermann, L.; Spicher, G.; Thomas, B.; Juretko, A.; Heyns, K.; Bolling, H.; Gerstenkorn, P.; El-Baya, A. W.; Zwingelberg, H.; Greenwood, C. T.; Stevens, D. J.; Meppelink, E. K.; Graveland, A.)
Veröffentlichung, Arbeitsgemeinschaft Getreideforschung eV No. 150, 191pp. (1973) [De]

The full text is given of the following papers presented at this conference, held under the auspices of the Society for Cereal Research and the Federal Cereal Processing Research Institute: Texture of bread and bakery products, by L. Wasserman (pp. 3-15, 33 ref.); Growth and aflatoxin formation by Aspergillus flavus on bread, by G. Spicher (pp. 17-27); Comparative studies on physical methods for determination of the consistency of bread, by B. Thomas & A. Juretko (pp. 29-44, 23 ref.); Nitrosamines in foods, by K. Heyns (pp. 45-54, 26 ref.); Effects of post-harvest treatments on the fat composition of corn, by H. Bolling, P. Gerstenkorn, A. W. El-Baya & H. Zwingelberg (pp. 55-61, 8 ref.); Modern methods for determination of protein, by H. Bolling (pp. 63-73, 7 ref.); Determination of protein in wheat and flour with the Research Association Protein Indicator Device (Rapid Meter), by C. T. Greenwood & D. J. Stevens (pp. 75-80); Determination of the [illegible] of wheat [illegible], by [illegible]

101

Survey of corn for Fusarium toxins.
Eppley, R. M.; Stoloff, L.; Trucksess, M. W.; Chung, C. W.
Journal of the Association of Official Analytical Chemists 57 (3) 632-635 (1974) [15 ref. En] [Div. of Chem. & Physics, FDA, Washington, DC 20204, USA]

Samples of the 1972 corn crop were collected in areas where the potential for Fusarium contamination of the corn was considered to be high or where known Fusarium damage had been reported. The 223 samples were collected in the spring following the crop yr from terminal elevators or from stocks on hand at food processing establishments and were analysed for zearalenone, aflatoxins, and T-2 toxin by a modified multimycotoxin detection method. A rabbit skin bioassay was used to screen for possible T-2 toxin at levels below the chemical detection limits. Zearalenone was found in 17% of the samples (0.1-5.0 mg/kg); aflatoxin was found in 5 samples (trace-10 µg/kg). A skin irritant was found in extracts from 93 of 173 samples by the rabbit skin bioassay. This effect may be due to the T-2 toxin or some other mycotoxin. AS

102

Rapid screening method for examining corn and corn-derived products for possible aflatoxin contamination.
Barabolak, R.; Colburn, C. R.; Smith, R. J.
Journal of the Association of Official Analytical Chemists 57 (3) 764-766 (1974) [7 ref. En] [Moffett Tech. Center, CPC International Inc., Argo, Illinois 60501, USA]

Aflatoxins were extracted from the sample by high-speed blending with aqueous acetone, purified with $(NH_4)_2SO_4$, re-extracted into benzene, evaporated to dryness, and redissolved in chloroform-acetone. The final solution was subjected to descending minicolumn chromatography through successive layers of alumina, silica gel, and Florisil, and the aflatoxin band was visualized by fluorescence. The method requires only 35-40 min, and results are semi-quantitative. AS

103

[Growth and aflatoxin production by Aspergillus flavus on bread.] Einige Beobachtungen über das Wachstum von Aspergillus flavus auf Brot und die Bildung von Aflatoxin.
Spicher, G.
Veröffentlichung, Arbeitsgemeinschaft Getreideforschung eV No. 150, 17-27 (1973) [De]

See FSTA (1974) 6 3M437.

104

[Toxic metabolites of moulds.] Toxische Stoffwechselprodukte von Schimmelpilzen. [Review]
Frank, H. K.
Alimenta 13 (3) 98-101 (1974) [31 ref. De] [Bundesforschungsanstalt für Lebensmittelfrischhaltung, Engesserstrasse 20, D-75 Karlsruhe, Federal Republic of Germany]

The most important mycotoxins in foods are reviewed, with special reference to carcinogenic mycotoxins, Fusarium toxins and cytochalasans. RM

105

How to detect aflatoxins in cereals, nuts and oilseed products.
Anon.
Food Engineering 46 (5) 109-110, 112 (1974) [En]

Outlines are given of suitable methods for sampling, defatting, extraction and clean-up in the detection of aflatoxins in cereals, edible nuts, oilseeds and oilseed products, and other commodities (e.g. cassava, sweet potato, cocoa, green coffee, cowpeas). Mention is made of the use of TLC for estimation of aflatoxin concn. JA

106

Nutrition, monocrotaline, and aflatoxin B_1 in liver carcinogenesis.
Newberne, P. M.; Rogers, A. E.
Plant Foods for Man 1 (1) 23-32 (1973) [20 ref. En] [Dept. of Nutr. and Food Sci., Massachusetts Inst. of Tech., Cambridge, 02139, USA]

Results of toxicity tests on monocrotaline (a pyrrolizidine alkaloid plant toxin) and aflatoxin B_1 fed to rats in a diet marginal in lipotropic factors are reported. Aflatoxin B_1 and monocrotaline appeared to act synergistically to induce liver cell carcinoma irrespective of the diet, although there appeared to be a dietary effect. It is suggested that limited exposure to one may predispose the liver to the carcinogenic action of the other. The possibility of contamination of diets or beverages in some developing countries focuses attention on the potential ability of plant toxins to contribute to liver disease. CRI

107

Experimental production of aflatoxin in citrus juice and peel.
Alderman, G. G.; Marth, E. H.
Journal of Milk and Food Technology 37 (6) 308-313 (1974) [36 ref. En] [Dept. of Food Sci., Univ. of Wisconsin, Madison, 53706, USA]

Grapefruit juice and peel each supported growth of and aflatoxin formation by Aspergillus parasiticus and Asp. flavus. Peel was a better substrate than juice for toxin production; amounts

of aflatoxin B_1 and G_1 were 5-10 times higher in peel when the same mould strain grew at 28°C in both substrates for ≤62 days. In juice, amounts of B_1 and G_1 produced by Asp. flavus markedly decreased after 18 days and then stabilized, whereas amounts of G_1 formed by Asp. parasiticus increased to 34 days then declined and stabilized. When the moulds grew on peel, amounts of B_1 and G_1 produced increased for 38 days (Asp. flavus) and 26 days (Asp. flavus and Asp. parasiticus), then declined and stabilized. Amounts of B_1 (Asp. parasiticus) increased rapidly early during incubation and then remained relatively constant through an extended holding time. Concn. of B_2 and G_2 formed by both moulds in each substrate did not significantly change during extended incubation. Asp. parasiticus grew in juice for 14 days at 28°C after which the juice was separated into 3 fractions. Solids fraction contained 72.8%, mould 16.9%, and filtrate 10.3% of the total amount of aflatoxin produced. Similar results were obtained with lemon and orange juice. Frozen storage (-18°C) of grapefruit juice containing aflatoxin did not significantly affect amount of aflatoxin recovered until after 18 wk. AS

108

Effect of groundnut on aflatoxin production.
Maggon, K. K.; Venkitasubramanian, T. A.
Indian Journal of Experimental Biology **11** (4) 356-357 (1973) [9 ref. En] [Dept. of Biochem., Vallabhbhai Patel Chest Inst., Univ., Delhi 7, India]

Effect of addition of groundnut and its various fractions on aflatoxin production by Aspergillus flavus and Asp. parasiticus was investigated. Addition of groundnut to growth medium increased aflatoxin production; results varied with the strain and the medium used. Fractionation of groundnut revealed the presence of both stimulatory and inhibitory factors. Different fractions gave different results with Asp. flavus and Asp. parasiticus. It is suggested that the stimulatory effects may be due to groundnut protein while inorganic factors present in groundnut may be responsible for both stimulation as well as inhibition. AS

109

Aflatoxins in sorghum grains infected with head moulds.
Tripathi, R. K.
Indian Journal of Experimental Biology **11** (4) 361-362 (1973) [3 ref. En] [Dept. of Plant Pathol., G. B. Pant Univ. of Agric. & Tech., Pantnagar, India]

Aflatoxins B_1, B_2, G_1 and G_2 were isolated from sorghum grains obtained from ears infected with head-moulds, which included a species of Aspergillus resembling Asp. flavus. The same aflatoxins were also isolated from sorghum grains inoculated with the sorghum isolate or Asp. parasiticus (NRLL 2999), a known aflatoxin producer. AS

110

Influence of Aspergillus candidus on production of aflatoxin in rice by Aspergillus parasiticus.
Boller, R. A.; Schroeder, H. W.
Phytopathology 64 (1) 121-123 (1974) [4 ref. En] [Market Quality Res. Group, USDA, College Station, Texas 77840, USA]

Infection by Asp. parasiticus, and the level of aflatoxin contamination, increased in rice stored at 35°C and 100% RH, following inoculation with mixtures of conidia of Asp. candidus and Asp. parasiticus, as the proportion of Asp. parasiticus increased. Infection by Asp. candidus remained high throughout storage regardless of the ratio of species in the inoculum. When the number of conidia of Asp. parasiticus in the inoculum was equal to or less than the number of conidia of Asp. candidus, Asp. candidus became the dominant species after 7 days in storage at 25-35°C and RH of 85, 90, and 100%. Only small amounts of aflatoxins, or none, were detected under these conditions. Aflatoxin B_1 in rice inoculated with the greatest ratio of Asp. parasiticus to Asp. candidus (7:1) ranged from 3 to 5% of that detected in rice inoculated only with Asp. parasiticus. Toxin production was reduced more rapidly than % of infection by Asp. parasiticus as a result of competition by Asp. candidus in all treatments. AS

111

Influence of relative humidity on production of aflatoxin in rice by Aspergillus parasiticus.
Boller, R. A.; Schroeder, H. W.
Phytopathology 64 (1) 17-21 (1974) [25 ref. En] [Market Quality Res. Group, USDA, College Station, Texas 77840, USA]

At 30°C, invasion and colonization of rice inoculated with Asp. parasiticus increased with storage humidity. At RH of 70, 75, and 80%, 15-30% of the kernels were infected. More rapid invasion and colonization by Asp. parasiticus, greater accumulations of aflatoxins, and greater activity by species of the natural mycoflora accompanied increases in the storage RH. Decreases in aflatoxin accumulations detected during late storage appeared to be associated with increased activity by species of the Asp. glaucus group. The latter relationship indicated that more attention should be given to the effect of competitive species during storage. AS

112

Influence of temperature on production of aflatoxin in rice by Aspergillus parasiticus.
Boller, R. A.; Schroeder, H. W.
Phytopathology 64 (3) 283-286 (1974) [13 ref. En] [Market Quality Res. Group, USDA, College Station, Texas 77840, USA]

Asp. parasiticus rapidly invaded rough rice stored at 85% RH, the min. RH which consistently

supported production of aflatoxins. After 14 days at 25, 30, or 35°C, almost 80% of the kernels were invaded. After 7 days, >90% of the kernels of inoculated rice were infected by Asp. parasiticus at 15, 25, 30, and 35°C and at temp. which alternated 20-24°C and 100% RH, the RH most favourable for max. production of aflatoxins. At 85% RH, small quantities of aflatoxins B_1 (trace, to 5 μg/kg) were detected in rice stored at 30 and 35°C. Aflatoxin production and/or accumulation in rice stored at 100% RH appeared to increase with temp. but not necessarily with prevalence of infection. Rates of infection and colonization of inoculated kernels by species of the natural mycoflora increased with temp. The relative dominance of species at different times during storage appeared to be temp.-related. Decreases in quantities of aflatoxins detected during storage appeared to reflect, in part, the activity of competing species. **AS**

113

[Aflatoxin residues in liver and muscles of broilers given aflatoxin with their feed.] Aflatoxin-Rückstände in der Leber und in der Muskulatur von Masthähnchen nach Verabreichung von aflatoxinhaltigen Futtermitteln.
Mintzlaff, H. J.; Lötzsch, R.; Tauchmann, F.; Meyer, W.; Leistner, L.
Fleischwirtschaft **54** (4) 774-778 (1974) [34 ref. En, de, fr] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Blaich 4, Federal Republic of Germany]

A total of 130 broilers were used in a feeding trial to evaluate the effects of diets containing 0, 0.025, 0.1, 0.5, 1.0, 2.0, 5.0, 10.0 or 15.0 ppm aflatoxin, fed for 8 wk, on the aflatoxin residue concn. in liver and thigh and breast muscle tissue of the birds. Residues were first detected in tissues of birds fed diets containing 0.1 ppm aflatoxin; at this concn., the symptoms of aflatoxicosis were minor, and the birds would have passed veterinary inspection. Aflatoxin residues in the tissues increased with increasing aflatoxin concn. in the feed. In addition to aflatoxins B_1 and G_1, which were present in the feed, aflatoxin M_1 was also detected in the tissues. The liver contained more aflatoxin than the muscles. **AS**

114

[Contamination of foods by fungi.]
Jemmali, M.
Bulletin Technique d'Information No. 287, 89-99 (1974) [37 ref. Fr] [Service des Mycotoxines, 16, Rue Nicolas-Fortin, 75013 Paris, France]

After a brief discussion of factors influencing growth of moulds on foods, problems of contamination of foods by mycotoxins are discussed with reference to a table summarizing the main toxigenic mould spp., the foods from which they have been isolated, the mycotoxins formed, and the symptoms of poisoning by each mycotoxin. AJDW

115

The use of fungi as food and in food processing. [Book]
Gray, W. D.
v+113pp. (1970) [348 ref. En] Cleveland, Ohio, USA; Chemical Rubber Co. Price $13 [Northern Illinois Univ., DeKalb, Illinois, USA]

The aim of this book, which is one of the CRC Monoscience Series, is to bring together information linking mycology (other than the involvement of fungi in food spoilage) to the food industry. The review is divided into sections on Direct use of fungi as food (mushrooms as human food, fungi as animal food); Use of fungi in food processing (cheese, meat, oriental fungus-processed foods); and Potential additional uses of fungi as food (mycelia of fleshy fungi, mould type mycelia, myxomycete plasmodia). The final section is devoted to toxic substances produced by fungi and covers toxicoses caused by species of Stachybotrys, Aspergillus, Penicillium, Pythomyces, Fusarium, Cladosporium, Alternaria and Mucor, as well as the widely investigated aflatoxin. **CDP**

116

Aflatoxin detection in corn: a simple screening test.
Seitz, L. M.; Mohr, H. E.
Cereal Chemistry **51** (4) 487-491 (1974) [10 ref. En] [Grain Marketing Res. Center, USDA, Manhattan, Kansas 66502, USA]

A simple screening test for aflatoxin in corn is described. The test can be completed in about 15 min and will detect aflatoxin at levels as low as 5 parts/billion. The method involves extraction of the grain with methanol in a blender, removal of fat and pigments by partitioning into hexane (or Freon-113) from an aqueous ammonium sulphate layer, and transfer of the aflatoxin from the aqueous layer into methylene chloride. Final detection is accomplished by a TLC procedure requiring only 3 min developing time. The presence of aflatoxin is indicated by a blue fluorescent spot at a specified position on the plate. Aflatoxin concn. can be estimated comparison of the sample spot with standards. **AS**

117

Aflatoxin: distribution in contaminated corn.
Shotwell, O. L.; Goulden, M. L.; Hesseltine, C. W.
Cereal Chemistry **51** (4) 492-499 (1974) [7 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

Individual kernels with the bright greenish-yellow fluorescence associated with the presence of aflatoxin and kernels without the fluorescence from contaminated white and yellow corn samples were assayed individually. Some kernels having a greenish-yellow fluorescence under the seed coat had to be split open before the typical fluorescence

became visible. All fluorescing kernels contained aflatoxin; none of the nonfluorescing ones did. The following fractions from 10 lots of aflatoxin-contaminated corn were analysed: (a) fluorescing intact kernels and pieces; (b) kernels with fluorescence visible under the seed coat; (c) damaged, cracked, or discoloured kernels, or in any combinations; and (d) outwardly sound kernels. Aflatoxins, but amounts and distribution of kernels. Aflatoxin was in all the listed fractions, but amounts and distribution of was found in the outwardly sound kernel portion because some kernels with fluorescence under the seed coat do not have an abnormal appearance even under UV light (365 nm). Fluorescing particles were observed in ground meals of outwardly sound kernels. AS

118

[Occurrence of aflatoxin in bakery products.] Zur Frage des Vorkommens von Aflatoxin in Teigwaren.
Spicher, G.
Getreide, Mehl und Brot **28** (7) 172-176 (1974) [15 ref. De] [Bundesforschungsanstalt für Getreideverarbeitung, Detmold, Federal Republic of Germany]

The importance of moulds as a source of mycotoxins is ponted out and sources of aflatoxins, their structure and toxic effects, occurrence in foodstuffs (including cereals and cereal products) and factors favouring such occurrence are discussed. Investigations are reported in which 61 samples of pasta products manufactured in 7 different factories were examined for concentrations of moulds, species present, capacity of the moulds for aflatoxin production (in white bread), and actual presence of aflatoxin in the products. Moulds averaged 30-950/g pasta product. The flora principally consisted of Aspergillus but also included Penicillium, Mucor, Cladosporium and Spicaria. Of 79 moulds isolated, 2 (identified morphologically as Asp. flavus) were aflatoxin producers. Aflatoxins B_1 and G_1 were detected in one product. MJD

119

Toxicity of fatty acids in assays for mycotoxins using the brine shrimp (Artemia salina).
Curtis, R. F.; Coxon, D. T.; Levett, G.
Food and Cosmetics Toxicology **12** (2) 233-235 (1974) [9 ref. En] [Chem. Div., Agric. Res. Council, Food Res. Inst., Colney Lane, Norwich NOR 7OF, UK]

An investigation of the potential mycotoxins produced by Aspergillus sydowi involved an established technique based on the toxicity of mycotoxin towards larvae of the brine shrimp. Fractionation of toxic extracts from the fungus showed that a major part of the obserbed toxicity resided in the fatty acid fraction, of which linoleic acid was a major component. Further investigations showed that some common naturally occurring fatty acids possess toxicity towards the brine shrimps comparable with that of several known mycotoxins. AS

120

New obligations imposed by current regulatory replications.
Hanold, T.
Food Product Development **7** (9) 30, 32, 34 (1973) [En] [Pillsbury Co., Minneapolis, Minnesota, USA]

Implications are considered, of current regulations in the following fields: food ingredients (additives, mycotoxins); consumer protection and processing; food labels; and food advertising. Present and future regulations in these fields are listed. VJG

COPYRIGHT REGULATIONS

Form of Declaration and Undertaking

To the Editor, International Food Information Service, Shinfield,
Reading RG2 9AT, Berkshire, England.

1. I ....

   of ....

   Hereby request you to make and supply to me a

   Photocopy of the article covered by

   Journal name ....

   Volume ...... Part ...... Pages .... Year ....

   which I require for the purposes of research or private study.

2. I have not previously been supplied with a copy of the said article/part of the said work by any librarian.

3. I undertake that if a copy is supplied to me in compliance with the request made above, I will not use it except for the purposes of research or private study.

   Signature* .... Date ....

   (*Note: This must be the personal signature of the person making the request. A stamped or typewritten signature or the signature of an agent is NOT sufficient.)

4. Send this form and remittance (10p per page) to the above address. (Minimum charge 50p)

(Note: Additional forms are available on request)

Additional Services available from IFIS

RETROSPECTIVE SEARCH SERVICE

- Over 50,000 documents in FSTA searched
- State-of-the-art or "quicky" telephone requests accepted
- Annual contracts with discount available
- Cost from £25
- Information available in 3 output formats
- Searches conducted by qualified food science graduates

PHOTOCOPYING SERVICE

- All journal articles abstracted in FSTA available promptly
- Cost 10p per page for single orders
- Deposit account service in operation
- Original articles available as output from retrieval services at 50p per article.

FOOD ANNOTATED BIBLIOGRAPHIES

Selected abstracts from Food Science and Technology Abstracts on important specialized aspects of food science and technology are now available as Food Annotated Bibliographies (FABs).

The FABs already completed are listed below, and further FABs are in preparation. Suggestions are welcomed for specific topics for additional bibliographies.

FAB	Title
1	Application of Reverse Osmosis to Food Processing
2	New Sources of Food Protein
3	Natural and Synthetic Sweeteners
4	Techniques for Analysis of Flavour Volatiles
5	Microwaves in Food Processing
6	Texture Analysis of Foods
7	Synthetic Dairy Products
8	Acidulants in Foods
9	Agglomeration of Powders
10	Aseptic Packaging
11	EEC Regulations
12	Toxicology of Food Additives
13	Deep Fat Frying
14	Viscosity of Foods
15	Taste Panels in Food Science
16	Taints in Foods
17	Microbial Toxins in Foods
18	Smoked Food Products
19	Disposal of Waste Food Products
20	Use of Glucose in Food Products
21	Emulsifiers in Foods
22	Stablizers in Food
23	Staling and Anti-staling Additives
24	Catering Industry

FAB	Title
25	Antixidants
26	Nitrosamines
27	Content and Analysis of Mercury in Foods
28	Content and Analysis of Lead in Foods
29	Heatable Packs
30	Sulphur Dioxide in Food Products
31	Lactic Acid Bacteria in Beverages and Food
32	Colarants
33	Browning of Foods
34	Aflatoxins
35	Antibotic Properties and Residues in Food (Excluding Nisin)
36	Nisin
37	Cadmium in Foods
38	Coffee
39	Sorbic Acid
40	Arsenic in Foods
41	Ascorbic Acid
42	Thickeners and Gelling Agents
43	Pseudomonadaceae and Food Processing
44	Spores in Food
45	Bread Making
46	Bread Properties
47	Books

Price:	Vol. 1-5 (inclusive)	**£6.00 – £16.00**
	Vol. 6	**£2.00 – £ 5.00**
	Vol. 7 (12 monthly issues)	**£4.00 – £ 6.00**

Prices include postage by surface mail. For airmail rates and full price list, please apply to address below.

To order or to obtain further information, mark the item required, and your name and address, and send to:

International Food Information Service,
Commonwealth Bureau of Dairy Science and Technology,
Shinfield, Reading RG2 9AT, England.

Name . . . .

Address . . . .

. . . .

. . . .

INTERNATIONAL FOOD INFORMATION SERVICE

ifis

FAB 34

AFLATOXINS

SELECTED FROM VOLUME 7
FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

under the direction of

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks; Institut fur Dokumentationswesen, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen; Zentralstelle fur maschinelle Dokumentation– Frankfurt am Main.

INTRODUCTION

Food Annotated Bibliographies (FABs) are collections of abstracts on specific topics in food science and technology. The topics are chosen by the staff of the International Food Information Service as being of particular interest or importance. The topics normally interest individual workers, who may not require the full information provided in Food Science and Technology Abstracts, from which the abstracts for FABs are taken. The size and the cost of the FABs are controlled as much as possible with the interests of individual workers in mind.

Titles of the FABs now available are given on the back cover of this booklet. New titles are being added at the rate of about 10 per year. For up-to-date lists of FABs or suggestions for new topics please write to the address given overleaf. New subjects are searched for at least the five most recent volumes of Food Science and Technology Abstracts. Thereafter each FAB is updated monthly. Copies of each months abstracts on any topic may be obtained as indicated on the back cover of this publication. At the end of each volume of up-dating, the abstracts are merged and made available as a separate supplement to the original FAB.

Some of the larger FABs have been divided into sections to facilitate use. Abstracts are not printed in more than one section. The larger FABs also have subject indexes provided.

Copies of all original articles referred to in the abstracts may be bought (or occasionally borrowed) from the International Food Information Service. A form for ordering these is provided at the end of this FAB.

Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journals patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

ASSISTANT EDITOR

1

Bioassay of aflatoxins by catfish cell cultures.
Vosdingh, R. A.; Neff, M. J. C.
Toxicology **2** (2) 107-112 (1974) [5 ref. En] [311 Forrest Hill, San Antonio, Texas 78209, USA]

A line of catfish cells, brown bullhead, was tested as an in vitro bioassay system for aflatoxins. The cells were found to be sensitive to 0.02 µg/ml of aflatoxin B_1. The rate of cellular degeneration in the cultures was related to the dose of aflatoxin B_1. AS

2

[Fluorescent compounds in fermented foods. II. Tests on aflatoxin contamination of miso and miso-koji in Japan.]
Manabe, M.; Ohnuma, S.; Matsuura, S.
Journal of Food Science and Technology [Nihon Shokuhin Kogyo Gakkai-shi] **19** (2) 76-80 (1972) [10 ref. Ja, en] [Nat. Food Res. Inst., Koto-ku, Tokyo, Japan]

108 samples of commercial miso, 33 of home-made miso and 28 of commercial koji for miso from almost all prefectures of Japan were examined. Detn. of aflatoxin was made according to the official ADAC method for peanuts. Because of the high moisture content (about 50%) of miso, 75% methanol was used as solvent instead of water/methanol (9:11 v/v). No aflatoxin was detected in any samples. A few samples showing an aflatoxin-like fluorescent substance on TLC did not show toxicity by the chick embryo method. [See FSTA (1969) **1** 3B119 for part I.] SKa

3

[Fluorescent compounds in fermented foods. III. Tests on aflatoxin contamination of rice.]
Manabe, M.; Matsuura, S.
Journal of Food Science and Technology [Nihon Shokuhin Kogyo Gakkai-shi] **19** (6) 268-274 (1972) [14 ref. Ja, en] [Nat. Food Res. Inst., Koto-ku, Tokyo, Japan]

46 samples of unpolished domestic rice of rather inferior quality (stored for 0.5-1.5 yr) were collected throughout Japan and 11 samples of rice imported from various countries in 1966 or 1967 were taken. Samples were: (i) kept at 30° for 7-10 days with sterilized water to cultivate microorganisms on the surface of the grains; (ii) kept similarly after sterilizing the surface of grains to cultivate microorganisms which might be contained within the grains; or (iii) untreated. No aflatoxin was detected in any sample. A few samples showed aflatoxin-like fluorescent substances on TLC but they showed no toxicity in the chick embryo test. Moulds (belonging to Aspergillus, Penicillium, and Rhizopus spp.) isolated from rice did not produce aflatoxins. SKa

4

[Fluorescent compounds in fermented foods. IV. Degradation of added aflatoxin during miso fermentation.]
Manabe, M.; Matsuura, S.
Journal of Food Science and Technology [Nihon Shokuhin Kogyo Gakkai-shi] **19** (6) 275-279 (1972) [9 ref. Ja, en] [Nat. Food Res. Inst., Koto-ku, Tokyo, Japan]

Aflatoxins B_1 and G_1 were stable at pH 4-5 and were decomposed at pH 1 and pH 9-10. At pH 1-3, aflatoxins B_1 and G_1 were converted to aflatoxins B_{2a} and G_{2a}, respectively. The pH of 95 samples of miso collected from many regions of Japan was 4.6-5.4, and the possibility of decomposition of aflatoxins due to H^+ was excluded. Small amounts of aflatoxins B_1, B_2, G_1 and G_2 were added to the mixed raw materials for miso before fermentation. Some aflatoxins B_1 and G_1 were decomposed during the early stage of fermentation and about 50% of both remained after 1 month of fermentation at 35°. Aflatoxins B_2 and G_2 were not changed during fermentation of miso. SKa

5

The occurrence of mycotoxins in foods and feeds.
Stoloff, L.
Abstracts of Papers, American Chemical Society **168**, AGFD 76 (1974) [En] [FDA, HFF-415, 200 C St., SW, Washington, DC 20204, USA]

This paper is concerned with the potential for encountering particular mycotoxins and the situations with which they may be associated. Natural occurrence of aflatoxins, citrinin, ergot, ochratoxin, patulin, penicillic acid, sporidesmin, sterigmatocystin, T-2 toxin, and zearalenone has been demonstrated. The vehicles have been raw agricultural commodities, e.g. nuts, grains, fruits, beans. Some contamination is associated with product abuse, some with apparently normal storage. Some contamination occurs in the field. These situations are explored toward the possibility of developing preventative measures. AS

6

Present knowledge regarding the role of aflatoxin in human disease.
Shank, R. C.
Abstracts of Papers, American Chemical Society **168**, AGFD 77 (1974) [En] [Dept. of Nutr. and Food Sci., Massachusetts Inst. of Tech., Cambridge, 02139, USA]

Since the finding that aflatoxin B_1 is the most potent hepatocarcinogen known, several international studies have been conducted to determine to what extent this toxin is causally related to liver cancer in man. In areas of Uganda and Swaziland where the incidence of liver cancer is high, aflatoxin contamination of food crops in those areas is also high. Dairy ingestion of aflatoxins, measured in Thailand and Kenya, correlated well with liver cancer incidence. It has been suggested that Indian childhood cirrhosis may be caused, in part, by repeated ingestion of aflatoxins. Assessment of aflatoxin ingestion is difficult, and more work is needed on detecting, in blood, urine, and faeces, metabolites or other indicators of aflatoxin consumption. Available evidence strongly suggests a causative role of aflatoxins in human liver carcinogenesis in certain areas of the world, but more information is needed to demonstrate that these toxins are factors in acute poisoning in man. AS

7

Chemical methods investigated for detoxifying aflatoxins in foods and feeds.

Beckwith, A. C.; Vesonder, R. F.; Ciegler, A.

Abstracts of Papers, American Chemical Society **168**, AGFD 78 (1974) [En] [N. Regional Res. Lab., USDA, 1815 N. University St., Peoria, Illinois 61604, USA]

Edible vegetable oils are dependably free of aflatoxins because the alkaline washes and bleaching agents used in refining the oil are among the chemical systems that destroy aflatoxin. Currently NH_3, in conjunction with elevated temp. or pressures, or both, as well as elevated moisture levels, offers the best way to detoxify agricultural commodities [see FSTA (1971) **3** 8C142 & (1973) **5** 10P1488]. Research has shown that ammoniation of contaminated whole corn reduces aflatoxin B_1 to a chemically nondetectable level and that the ammoniation products are nontoxic to ducklings and chickens. Using radioactive labelled aflatoxin B_1 to spike white corn meals, it was shown that ammoniation at ambient temp. induces the covalent binding of B_1 primarily to corn proteins and water-soluble components. AS

8

Effect of low dose gamma irradiation on growth and aflatoxin production by Aspergillus parasiticus.

Bullerman, L. B.; Hartung, T. E.

Journal of Milk and Food Technology **37** (8) 430-434 (1974) [15 ref. En] [Dept. of Food Sci. & Tech., Univ. of Nebraska, Lincoln, 68503, USA]

Spores and growing vegetative mycelia of Asp. parasiticus strains NRRL 2999 and NRRL 3000 were irradiated at 100 and 200 krad, and effects on growth and aflatoxin production in yeast-extract sucrose (YES) broth were measured. Irradiation of growing mycelia reduced subsequent growth in YES broth by a greater amount than irradiation of spores. Irradiation of spores at 100 krad resulted in more B_1 and G_1 production by strain NRRL 2999 than non-irradiated control, however, strain NRRL 3000 produced less B_1 and G_1 after irradiation at 100 krad than non-irradiated control. Spores of both strains irradiated at 200 krad produced less B_1 and G_1 than non-irradiated controls. Irradiation of growing vegetative mycelia of both strains resulted in a definite decline in B_1 and G_1 in subsequent cultures at each irradiation level. Apparent stimulation of production of B_1 and G_1 occurred after irradiation of spores of strain NRRL 2999 at 100 krad. However, variation of values, as determined by SD, was such that one would conclude that no differences existed among means. AS

9

Analysis of aflatoxins by high speed chromatography.

Williams, R. C.; Baker, D. R.; Larmann, J. P.

Abstracts of Papers, American Chemical Society **168**, AGFD 82 (1974) [En] [E. I. DuPont de Nemours & Co., Instrument Products Div., Wilmington, Delaware 19898, USA]

High speed liquid chromatography can be used to separate and determine trace amounts of aflatoxins in foods. B_1, B_2, G_1, and G_2 aflatoxins can be separated completely in <15 min on a 25 cm column of small particle silica. Speed of separation as well as order of elution of aflatoxins from the column can be controlled by proper selection of mobile phase. 2 specific and sensitive detectors, fluorescence and UV absorbance at 365 nm, can be used for analysis of aflatoxins in food extracts. A sensitive UV absorbance detector can be used to detect <5 ng aflatoxins. Since very few other components in food extracts absorb at this wavelength a UV absorbance detector at 365 nm is specific for aflatoxins. Aflatoxins also fluoresce with an excitation at 365 nm and emission at about 430 nm. G aflatoxins have an enhanced fluorescence in a chloroform mobile phase so that as little as 0.1 ng can be detected. This means that as little as 0.1 part/billion of G aflatoxins can be extracted and determined in food. Fluorescence of B aflatoxins is about 30 times less intense than G aflatoxins. Chromatograms of aflatoxin extracts from food products with both fluorescence and UV absorbance detection are shown and discussed. AS

10

Dichlorvos as an inhibitor of aflatoxin production in wheat, corn, rice and peanuts.

Rao, H. R. G.; Harein, P. K.

Annales de Technologie Agricole **22** (3) 477-481 (1973) [12 ref. En, fr, de] [Dept. of Pediatrics, Univ. of Minnesota, Saint-Paul, Minnesota, USA]

This paper, presented at the symposium 'Preservation of wet harvested grain' (held in Paris, France, 5-10 March 1973) gives details of studies on the use of dichlorvos for control of aflatoxin formation in stored grain. Samples of rice, corn, wheat and shelled peanuts were treated with 0, 5, 10 or 20 ppm dichlorvos before or after inoculation with the toxinogenic strain Aspergillus flavus NRRL-2999. The samples were then incubated for 7 days at 27°C and 70% RH, after which the aflatoxin concn. was determined. Tables of results are given. Treatment with 20 ppm dichlorvos before inoculation reduced aflatoxin formation in corn, wheat and peanuts to very low levels; aflatoxin concn. in rice were considerably reduced by dichlorvos treatment, but remained at measurable levels (11.2-14.9 ppm, as compared to 33.7-114.5 ppm in untreated samples). The degree of inhibition of aflatoxin formation increased with increasing dichlorvos concn. Treatment with dichlorvos 2-4 days after inoculation reduced but did not prevent aflatoxin formation; aflatoxin concn. in wheat samples treated with 20 ppm dichlorvos 2 and 4 days after inoculation were, respectively, 0-22.7 ppm and 10-33.9 ppm, as compared to 92.3-114.0 ppm in non-dichlorvos treated samples. AJDW

11

[Preservation of wet-harvested grain.]
Multon, J.-L.; Guilbot, A. (Editors)
Annales de Technologie Agricole **22** (3) 171-561; (4) 567-916 (1973) [many ref. Fr, En, Es, De]

[Continued from preceding abstr.] Dichlorvos as an inhibitor of aflatoxin production in wheat, corn, rice and peanuts, by H. R. G. Rao & P. K. Harein (pp. 477-481, 12 ref., En); Control of microflora on moist grain, by S. K. Majumder, A. N. Ragunathan & T. R. Rangaswamy (pp. 483-492, 25 ref., En); Studies on the effects of drying on the microbial count of cereals, by G. Spicher & D. Weipert (pp. 493-505, 6 ref., De); Problems of infestation by insects and mites of cereals stored in western Europe, by J. A. Freeman (pp. 509-530, 17 ref., En); The effect of Tribolium infestations on the baking and taste qualities of bread made from infested hardwheat flour, by L. W. Smith Jr.; P. D. Pratt & J. J. Pratt (pp. 551-555, 2 ref., En); Changes in moist grain stored under airtight conditions, by H. Gasiorowski (pp. 719-725, 4 ref., De); Underwater storage of cereal grains by CEM skin-packaging technique, by H. Mitsuda, F. Kawai, M. Kuga & A. Yamamoto (pp. 751-755, En); Microbiological aspects of gamma-irradiation of moist corn, by J. Poisson & B. Cahagnier (pp. 757-772, 17 ref., Fr); Conservation of wheat in silos under nitrogen, by J. Shejbal, A. Tonolo & G. Careri (pp. 773-785, 28 ref., En); Effects of harvesting, drying and storage conditions on the nutritional value of cereals, by C. Calet (pp. 789-806, 37 ref., Fr); [continued in following abstr.] AJDW

12

Determination of aflatoxin in grain and foodstuffs.
Alisauskas, V. A.
Food Technology in Australia **26** (6) 233, 235, 237 (1974) [8 ref. En] [Res. Centre, Kimpton Minifie McLennan Ltd., Lyndhurst, Victoria, 3975, Australia]

92 samples of grain and common feed ingredients were analysed in Australia using TLC and a rapid micro-column screening method. Analytical details are outlined. 3 samples containing aflatoxin were found; a sorghum grain containing 30 µg/kg aflatoxin B_1, and 2 samples of mouldy peanuts containing 2500 µg/kg B_1 and 400 µg/kg B_2, and 200 µg/kg B_1 and 30 µg/kg B_2, respectively. It is concluded that the majority of properly stored agricultural commodities should present no problem of aflatoxin contamination. PG

13

Evaluating the potential for occurrence of aflatoxins in black sunflower seeds.
Llewellyn, G. C.; Eadie, T.
Journal of the Association of Official Analytical Chemists **57** (4) 858-860 (1974) [13 ref. En] [Dept. of Biol., Virginia Commonwealth Univ., Richmond, Virginia 23284, USA]

A modified cottonseed extraction and purification procedure was used to detect aflatoxins in samples of sunflower seeds. No aflatoxins (<2 parts/billion) were detected in >50 random samples taken from varied lots of commercial seeds on sale in central Virginia. No Aspergillus flavus-like or A. parastitious-like organisms were seen in cultures of the natural flora of such seeds when grown on both whole and crushed seeds. No naturally occurring aflatoxins (<2 parts/billion) were detected in the cltures. Standing cultures of crushed seeds, when inoculated with A. flavus ATCC 15548, resulted in 271 µg total aflatoxin/g medium within a 2 wk period of growth at room temp. Crushed seed cultures had the following ratios for B_1, B_2, G_1, and G_2: 12, 1, 17, and 3, respectively. Whole seed cultures tested about 25% lower than crushed cultures for total aflatoxin content but whole cultures did lack detectable levels of B_2. The whole seed cultures had the following ratios for B_1, B_2, G_1, and G_2: 13, 0, 19, and 2. Black sunflower seeds, whole or crushed, will support the growth of A. flavus and the production of aflatoxins at levels that may approach that of rice medium but not that of coconut medium. AS

14

[Residues of contaminants in milk.]
Fremdstoffrückstände in Milch.
Brandl, E.
Österreichische Milchwirtschaft **29** (17) 305-309 (1974) [15 ref. De] [Tierärztliche Hochschule, Vienna, Austria]

This general review deals with residues of pesticides, antibiotics and other veterinary medicaments, detergents and disinfectants, radioactive isotopes and, in particular, haevy metals (Pb, Hg and Cd) and aflatoxins in milk and milk products. ADL

15

A comparison of photometric detectors for high speed liquid chromatography.
Baker, D. R.; Williams, R. C.; Steichen, J. C.
Journal of Chromatographic Science **12** (9) 499-505 (1974) [13 ref. En] [E. I. DuPont de Nemours & Co., Instrument Products Div., Wilmington, Delaware 19898, USA]

The following detectors were compared: a fixed wavelength (254 nm) photometer, a multi-wavelength filter photometer, a combination absorbence-fluorescence photometer, and a variable wavelength spectrophotometer. Advantages and disadvantages of each detector are discussed as well as their abilities to function either as all-purpose or specific detectors. The detection of vitamin A alcohol in milk extract using a multi-wavelength filter photometer operating at 254 and 334 nm, and of aflatoxin B_1 in peanut butter extract at 254 and 365 nm are discussed, as well as the detection of riboflavin in a noodles and beef dinner using an absorbence-fluorescence detector. Chromatograms are given. AL

16

[A toxicity test for mycotoxins using the brine shrimp (Artemia salina).]
Yamamoto, K.; Tsubouchi, H.; Moriyama, S.; Sakabe, Y.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] 15 (1) 11-17 (1974) [19 ref. Ja, en] [Health Res. Inst., 1-11 Hagiyama-cho, Mizuho-ku, Nagoya, Japan]

The aflatoxin B_1 toxicity test using the brine shrimp was modified. NaCl was added to sea water in a proportion of 1.7%. To 1 ml of this in a small evaporation dish, 20-30 newly-hatched brine shrimps were added and exposed to mycotoxin at 30°C for 24 h. The modified method was applicable to sterigmatocystin, diacetoxyscirpenol, T-2 toxin, fusarenone X and aflatoxins B_1 and G_1. [See also FSTA (1969) 1 7C302.] TM

17

[Contamination of foods by aflatoxins and other mycotoxins.] [Review]
Pantovic, D.; Adamovic, V. M.
Hrana i Ishrana 15 (1/2) 84-93 (1974) [58 ref. Sh, en] Zavod za Zdravstvenu Zastitut SRS, Belgrade, Yugoslavia]

18

Studies on groundnut protein concentrates prepared by alcohol and acid washing of the defatted flour.
Nagaraj, H. K.; Subramanian, N.
Journal of Food Science and Technology, India 11 (2) 54-57 (1974) [21 ref. En] [Central Food Tech. Res. Inst., Mysore, India]

Defatted groundnut flour was extracted with 80% ethanol, 80% isopropanol and 0.05 N HCl with a view to obtaining bland protein concentrate. The total soluble solids extracted were about 15% with the alcohols and about 22% with acid. The acid-extracted residue contained about 67% protein and showed a very low trypsin inhibitor activity. All the 3 extracted samples had aflatoxin levels below detectable limits while the original sample had 38 parts/billion. The nutritional value of the protein measured as PER remained unaffected in the extracted residues. AS

19

Collaborative study comparing two methods for the determination of aflatoxins in pistachio nuts.
DiProssimo, V.
Journal of the Association of Official Analytical Chemists 57 (5) 1114-1120 (1974) [8 ref. En] [FDA, 850 Third Avenue, Brooklyn, New York 11232, USA]

Two official first action methods for the detn. of aflatoxins in peanuts and peanut products, method I (26.015-26.020) and method III (26.026-26.030), were modified slightly for the analysis of pistachio nuts. 13 collaborators analysed naturally contaminated in-shell pistachio nuts, aflatoxin-free pistachio nuts, and pistachio nut composites spiked with known amounts of aflatoxins. The extraction and cleanup in method III are relatively simple and require no chromatography, whereas the lengthier method I employs column chromatography, producing a cleaner TLC extract. On the basis of the collaborative results obtained, both methods have been adopted as official first action for the determination of aflatoxins in in-shell pistachio nuts. AS

20

[The problem of mycotoxins in the production and processing of groundnuts and pecans in the USA.]
Mykotoxinprobleme bei der Produktion und Verarbeitung von Erdnüssen und Baumnüssen in den USA. [Review]
Escher, F.
Lebensmittel-Wissenschaft + Technologie 7 (5) 255-260 (1974) [42 ref. De, en] [Inst. für Lebensmittelwissenschaft, Eidgenössische Tech. Hochschule, Universitätstrasse 2, 8006 Zürich, Switzerland]

21

Experimental production of aflatoxin on intact citrus fruit.
Alderman, G. G.; Marth, E. H.
Journal of Milk and Food Technology 37 (9) 451-456 (1974) [30 ref. En] [Dept. of Food Sci., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Surfaces of intact citrus fruits were inoculated with spores of Aspergillus parasiticus and the fruits incubated at 24-30°C and 13.93% RH. With 13-20% RH, no mould growth occurred on limes and growth was not observed on grapefruits until 7 days' incubation. After 14 days, mould growth was noted on a portion of grapefruits, lemons, and oranges. Although surface areas of fruits without mould growth were dry and brittle, they failed to achieve equilibrium with the atmosphere. When fruit was incubated at 66-93% RH, fungal growth was considerably faster and more polific. Generally, $\frac{1}{3}$-$\frac{1}{2}$ of the surface of each inoculated fruit was covered with mycelium after 4 days' incubation. Sporulation by mould began at this time. After 7, 10, and 14 days' incubation, all fruits were totaly covered with mycelium and spores. RH of 66-93% caused no appreciable difference in amount of aflatoxin present in peels of various fruits. The edible portion (endocarp) of grapefruit contained aflatoxins B_1, B_2, G_1 and G_2 after only 4 days' incubation. In another sample of grapefruit, aflatoxin penetrated 26-33 mm into endocarp after 7 days. After 7 and 10 days, aflatoxin was recovered from samples of lemon lime endocarp, respectively. In one lemon, after 7 days, aflatoxin appeared in endocarp 20-26 mm below the surface. Amoung of aflatoxin in endocarp became less as the distance from the surface increased. AS

22

Observation on the thin layer chromatographic development of corn extracts with ethyl ether.
Trucksess, M. W.
Journal of the Association of Official Analytical Chemists **57** (5) 1220-1221 (1974) [2 ref. En] [Div. of Food Tech., FDA, Washington, DC 20204, USA]

The separation of aflatoxin from interfering lipids in one rapid TLC development is achieved by selecting the proper combination of a specified type of silica gel and grade of ethyl ether. AS

23

[Fungal contamination of cereals and cereal products, and aflatoxin production by isolated Aspergillus flavus.]
Mori, M.; Takahashi, T.; Onoue, Y.; Takahashi, T.; Aibara, K.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] **15** (2) 94-99 (1974) [19 ref. Ja, en] [Kanagawa Prefectural Public Health Lab., Nakano-cho, Asahi-ku, Yokohama, Japan]

Fungi and yeasts were found in 77% of samples examined. Average numbers of fungi and yeasts were: 23 000/g in buckwheat flour, 240/g in wheat flour, 90/g in roasted soybean flour, 130/g in soybean and 280/g in raw peanut with shell. Bacterial counts were also evaluated. The predominant fungus was Penicillium (44%) followed by Aspergillus (24%). Of 23 strains of Aspergillus isolated, 10 from buckwheat flour and wheat flour were identified as Asp. flavus. 5 of these produced aflatoxin B_1 and/or B_2 in vitro. Only one strain (isolated from wheat flour) produced aflatoxin B_1 in fairly large amounts. Aflatoxin itself was not detected in the material from which Asp. flavus had been isolated. TM

24

Detoxification process for groundnut cake or protein or any foodstuff containing aflatoxin.
India, Council of Scientific and Industrial Research
Indian Patent 105 607 (1974) [En]

Aflatoxin-containing foodstuffs are detoxificated by treating them with hydrogen peroxide. W&Co

25

Aspergillus flavus and aflatoxin in preharvest corn from Indiana in 1971 and 1972.
Rambo, G. W.; Tuite, J.; Caldwell, R. W.
Cereal Chemistry **51** (5) 595, 600-604 (1974) [14 ref. En] [Dept. of Botany and Plant Pathol., Purdue Univ., West Lafayette, Indiana 47907, USA]

No Asp. flavus infection was detected in 156 samples of preharvest sound corn from Indiana in 1971 and only 0.08% (all from southern Indiana) from 369 samples in 1972. Samples were routinely treated with 5% NaClO. Incidence of Asp. flavus infection increased slightly in selected samples surface disinfected with 1% NaClO for 30 s and cultured at 35°C, but no aflatoxin was detected in these infected samples. Asp. flavus averaged 0.6 and 1.6% in physically damaged corn in 1971 and 1972, respectively. Asp. flavus and aflatoxin detected in 8 of 163 combine-harvested corn samples may have developed after harvest. A bringht greenish-yellow fluorescence (BGYF), similar in appearance to the BGYF reported in Asp. flavus-infected corn, was noted on unifected kernels and cobs free of aflatoxin. AS

26

[Rapid method for determination of aflatoxin B_1.]
Juszkiewicz, T.; Piskorska-Pliszczynska, J.
Bromatologia i Chemia Toksykologiczna **6** (4) 419-424 (1973) [8 ref. Pl, ru, en] [Zaklad Farmakologii i Toksykologii Inst. Weterynarii, Pulawy, Poland

A simplified procedure is described for the detn. of aflatoxin B_1 in plant material. The method involves extraction with acetone and benzene followed by chromatographic partition in small columns filled with aluminium oxide, silica gel, florisil and sand. Concn. of aflatoxin B_1 is measured by comparison with standard columns under UV illumination. The method takes only 25 min., can detect 5 μg aflatoxin/kg material, and may be suitable for preliminary estimation of the aflatoxin level in kibbled grain and feed mixtures. AS

27

[Mycotoxins.] Mykotoxine.
Lienert, E.
Wiener Tierärztliche Monatsschrift **61** (8/9) 237-240 (1974) [De, en] [Pharmakologisches Inst., Tierärztliche Hochschule, Vienna, Austria]

The following mycotoxins are considered from the viewpoint of the clinical syndromes they produce in animals, potential dangers to man being mentioned: ergot alkaloids, lactones, dicoumarol, ochratoxins, aflatoxins, rubratoxins, zearalenone, sterigmatocystin, kojic acid, and aspergillic acid. Occurrence in cereals and cereal products, nuts, sausages, ham, legumes, oats, rice, fats, milk and cheese is tabulated. SKK

28

Carcinogenicity of synthetic aflatoxin M_1 in rats.
Wogan, G. N.; Paglialunga, S.
Food and Cosmetics Toxicology **12** (3) 381-384 (1974) [15 ref. En] [Dept. of Nutr. & Food Sci., Massachusetts Inst. of Tech., Cambridge, Massachusetts 02139, USA]

Weanling male Fischer rats were dosed by intubation with 0.5 ml of a freshly prepared suspension of aflatoxin in distilled water (5 days/wk for 8 consecuitve wk). 30 rats were treated with aflatoxin M_1 and 10 with aflatoxin B_1, each animal receiving 25 μg/day. All rats treated with aflatoxin B_1 developed hepatocellular carcinomas. Only 1 rat dosed with aflatoxin M_1 developed a hepatocellular carcinoma. This animal was killed after 96 wk and the remainder after 100 wk. These findings indicate that M_1 is much less potent than B_1 as a carcinogen for rat liver. VJG

29

Two-dimensional thin layer chromatography of aflatoxins in figs.
Allen, L.
Journal of the Association of Official Analytical Chemists 57 (6) 1398-1401 (1974) [9 ref. En] [FDA, 850 Third Av., Brooklyn, New York 11232, USA]

A method is described for the identification and analysis of aflatoxins in figs. It is based on 2-dimensional TLC, using an antidiagonal spotting technique after sample cleanup in accordance with AOAC official first action Method 1 for nuts and nut products, 26.15-26.020. Plates were developed in the first direction with toluene-ethyl acetate-90% formic acid (5 + 4 + 1) and in the second direction with acetone-chloroform (1 + 9). Results obtained by this method and those obtained by conventional TLC methods are comparable. The advantage of the described method, however, is that a fluorescent artifact present in figs no longer interferes in the B_2-G_1 region. AS

30

Aflatoxin production in sunflower (Helianthus annuus) seed varieties.
Nagarajan, V.; Bhat, R. V.; Tulpule, P. G.
Current Science 43 (19) 603-604 (1974) [12 ref. En] [Nat. Inst. of Nutr., Indian Council of Med. Res., Hyderabad 500007, India]

The toxin production in 5 varieties of sunflower seeds inoculated with Aspergillus flavus (2 isolates) or A. parasiticus (3 isolates) varied considerably under laboratory conditions. Aflatoxin production was markedly lower for sunflower (6-16 ppm) than for soybean or groundnut (20-30 and 25-50 ppm respectively) when inoculated with A. parasiticus NRRL 2999. When broken seeds of 4 sunflower varieties were inoculated, aflatoxin production was 15.62-39.05 ppm indicating that the thick seed coat normally protects the seed from infection. It is suggested that sunflower seeds should be dehulled just prior to extraction of oil. AL

31

Collaborative study of the determination of aflatoxin M_1 in milk.
Purchase, I. F. H.; Stubblefield, R. D.; Altenkirk, B. A.
Information Bulletin, International Union of Pure and Applied Chemistry, Technical Reports No. 11, 21pp. (1974) [13 ref. En] [Nat. Res. Inst. for Nutritional Diseases, Pretoria, South Africa]

Milk samples were analysed for aflatoxin M_1 content by 13 international laboratories using the method of Jacobson et al. [see FSTA (1971) 3 7P1084] for 8 reconstituted dried milk samples and that of Purchase & Steyn [Journal of the Association of Official Analytical Chemists (1967) 50, 363-66] for 8 samples of dried milk containing 0-50 μg aflatoxin M_1/kg. Both methods gave a precision similar to that obtained with other AOAC methods for agricultural products. The sensitivity was 0.1 μg aflatoxin M_1/l. for liquid milk and 1 μg/kg for dried milk. Variations between results from different laboratories and problems of low recoveries of aflatoxin M_1 added to milk powder are discussed. MEG

32

Influence of aflatoxins in feed on their secretion in milk. [Conference proceedings]
Kiermeier, F.; Mucke, W.
XIX International Dairy Congress 1E, 104-105 (1974) [2 ref. En] [Inst. of Dairy Sci., Tech. Univ., Weihenstephan, Munich, Federal Republic of Germany]

Aflatoxin was secreted in milk for 4-5 days following the feeding of 4 cows with groundnut meal containing 10.9 mg aflatoxin (B_1, B_2, G_1 and G_2)/kg. Aflatoxins B_1 and B_2 were found in milk as M_1 and M_2 metabolites, whereas G_1 and G_2 were not. DMK

33

The transmission of aflatoxin B_1 into eggs.
Jacobson, W. C.; Wiseman, H. G.
Poultry Science 53 (5) 1743-1745 (1974) [10 ref. En] [Div. of Vet. Med. Res., Food & Drug Admin., Dept. of Health, Education & Welfare, Washington DC 20204, USA]

Aflatoxin B_1 was incorporated at levels of 0.1, 0.2, and 0.4 ppm in a laying mash ration which was fed to laying hens. The eggs from hens at all three feeding levels contained measurable amounts of aflatoxin B_1. Some eggs from hens given the ration containing 0.4 ppm were stored at 3°C, for 9 months before analysis; no aflatoxin was found in these eggs. AS

34

Loss of ascorbic acid from grapefruit juice when cultured with Aspergillus parasiticus.
Alderman, G. G.; Marth, E. H.
Journal of Milk and Food Technology 37 (11) 551-552 (1974) [8 ref. En] [Dept. of Food Sci., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Ascorbic acid was added to single-strength grapefruit juice that was then inoculated with Aspergillus parasiticus. Up to approx. 9.8 mg ascorbic acid/ml juice failed to inhibit either growth or aflatoxin synthesis by the mould. Loss of ascorbic acid during 18 days at 28°C was greater from inoculated than from uninoculated grapefruit juice that initially contained about 20 times the normal amount of the vitamin. AS

35

A study on aflatoxin and mold contaminations in improved variety pecans.
Escher, F. E.; Koehler, P. E.; Ayres, J. C.
Journal of Food Science 39 (6) 1127-1129 (1974)

[19 ref. En] [Dept. of Food Sci., Univ. of Georgia 30602, USA]

16 lots of improved variety pecans were air-classified into sound (food grade) nuts and 2 groups of blow-outs or culls, (i) and (ii), with successively lower meat yield. None of the lots of (ii) blow-outs, one lot of (i) blow-outs and 2 lots of sound nuts contained traces of aflatoxins B_1 and G_1. Fungal mycelium was visible on the surface of 9% of the sound pecan kernels and 23% of the (i) blow-outs. Plating of surface sterilized half-kernels yielded colonies of Aspergillus flavus and A. parasiticus in 1-2 of 50 sound or (i) blow-out pecans. IFT

36

Aspergillus flavus infection and aflatoxin production in corn: influence of trace elements.
Lillehoj, E. B.; Garcia, W. J.; Lambrow, M.
Applied Microbiology **28** (5) 763-767 (1974) [14 ref. En] [N. Regional Res. Lab., Agric. Res. Service, USDA, Peoria, Illinois 61604, USA]

Distribution of trace element levels in corn germ fractions from kernels naturally infected with Aspergillus flavus and from kernels free of the fungus demonstrated an association between the presence of A. flavus and higher levels of metals. A. flavus production of aflatoxin on various autoclaved corn media showed that ground, whole corn was an excellent substrate; similar high levels of toxin were observed on full-fat corn germ but endosperm and defatted corn germ supported reduced yields. The influence of trace elements and their availability in defatted corn germ to A. flavus-mediated aflatoxin biosynthesis were measured. Enrichment of the substrate with 5-10 μg of Mn, Cu, Cd or Cr/g of germ increased toxin yields. Addition of Pb or Zn (50-250 μg/g) also enhanced toxin accumulation. Aflatoxin elaboration was reduced by the addition of 25 μg Ca/g or 500 μg Cu/g of germ. AS

37

The influence of aflatoxin B_1 on enzymes in milk.
[Conference proceedings]
Kiermeier, F.
XIX International Dairy Congress **1E**, 335-336 (1974) [En] [Dairy Inst., Weihenstephan, Federal Republic of Germany]

Aflatoxin B_1 at 44-53 μg/ml inhibited, in vitro, milk catalase and alkaline phosphatase, and at 59 μg/ml had no effect on milk peroxidase. At 113 μg/ml, the aflatoxin caused a 350% increase in milk acid phosphatase. In vitro changes were partly in agreement with changes in vivo (pelleted aflatoxin B_1 fed to cows). DMK

38

Inhibition of aflatoxin production by cinnamon.
Bullerman, L. B.
Journal of Food Science **39** (6) 1163-1165 (1974) [18 ref. En] [Dept. of Food Sci. & Tech., Univ. of Nebraska, Lincoln, Nebraska 68503, USA]

White, rye and whole wheat breads supported growth and aflatoxin production by Aspergillus parasitucus strains NRRL 2999 and NRRL 3000. Mould growth on raisin bread containing cinnamon was very limited and aflatoxin production was absent or greatly reduced from that observed on the other breads. An examination of 2 of the raisin bread ingredients, raisins and cinnamon, showed that the moulds would grow and produce aflatoxins on raisins if sufficient moisture was available for growth. Cinnamon at concn. ranging from 0.02-20% inhibited mould growth and aflatoxin production in various degrees in yeast-extract sucrose broth. The inhibitory effect was greater on aflatoxin production than on mould growth, with cinnamon levels of 2.0% inhibiting aflatoxin production by 97-99%. An alcoholic extract of cinnamon in similar amounts was also inhibitory to mould growth and aflatoxin production. Amounts of the extract corresponding to 1-2% of cinnamon reduced aflatoxin production by more than 99% in glucose ammonium nitrate broth. IFT

39

Aflatoxins in shelled peanuts and peanut products used as human foods. Proposed tolerance.
United States of America, Food & Drug Administration
Federal Register **39** (236, Dec. 6) 42748-42752 (1974) [En] [Washington, DC, USA]

A summary of an unpublished survey for aflatoxins is given. From 146 establishments, 361 samples of peanut butter and other finished peanut products were collected in 1973. Total aflatoxins above 20 parts/billion (ppb) were found in 4% of the 141 peanut butter samples and 2% of the 220 samples of unground peanuts. Detectable aflatoxin (>1 ppb) was found in 25% of the peanut butter and 10% of the unground peanut samples. A tolerance of 15 ppb is proposed for total aflatoxins (B_1, B_2, G_1, G_2) in shelled peanuts and peanut products used as human food. CAS

40

Comparison of methods for aflatoxin analysis by high-pressure liquid chromatography.
Seitz, L. M.
Journal of Chromatography **104** (1) 81-89 (1975) [7 ref. En] [USDA, Agric. Res. Service, US Grain Marketing Res. Center, 1515 College Avenue, Manhattan, Kansas 66502, USA]

Reversed-phase columns packed with octadecyl and phenyl reversed phases did not provide adequate separation of aflatoxins. A pellicular adsorption column provided partial separation, i.e. B_1 and B_2 from G_1 and G_2, but not B_1 from B_2 nor G_1 from G_2. A microparticulate adsorption (Micro-A) column completely separated aflatoxins B_1, B_2, G_1, and G_2. Detection was more selective at 350 nm (or 365 nm) than at 254 nm. A Fluoro Monitor Model 1209 detector (Laboratory Data

Control Corp.) was more sensitive for aflatoxins G_1 and G_2 than for B_1 and B_2. Aflatoxin B_1 at the 30-ppb level in yellow corn was detected with the Micro-A column and the 350-nm photometer. The limit of detection was estimated at about 10 ppb. AS

41

A dual-purpose absorbance-fluorescence detector for high-pressure liquid chromatography.
Steichen, J. C.
Journal of Chromatography **104** (1) 39-45 (1975) [3 ref. En] [Du Pont Instrument Products Div., Wilmington, Delaware 19898, USA]

A detector has been designed for high-speed liquid chromatography that simultaneously responds to sample absorbance and fluorescence in a single flow cell. Besides the advantages offered by different detection systems, the absorbance measurements provide a method for monitoring the fluorescence ‚inner filter' effect. The vol. of the cell is small; the absorbance segment is 16 ul. and included in it is the 8-μl fluorescence segment. The min. detectable concn. (signal-to-noise ratio = 2) of quinine in 0.1N sulphuric acid is 0.3 ng/ml. The cell performs as well as an absorbance cell as other small-vol. cells. A typical application of the detector would be aflatoxin analysis of food products. AS

42

Carcinogenic effects of low dietary levels of aflatoxin B_1 in rats.
Wogan, G. N.; Paglialunga, S.; Newberne, P. M.
Food and Cosmetics Toxicology **12** (5/6) 681-685 (1974) [8 ref. En] [Dept. of Nutr. & Food Sci., Massachusetts Inst. of Tech., Cambridge, Massachusetts 02139, USA]

Investigations were carried out into the effects of low dietary levels of aflatoxin B_1 and the dose-response relationship that might be expected at these levels. Male Fischer rats (80 g) were fed a semi-synthetic diet containing aflatoxin B_1 at 1, 5, 15, 50 and 100 μg/kg (parts/billion), for up to 150 wk. At 50 and 100 ppb levels incidence of induced hepatocellular carcinomas was high, and at other levels there was a lower incidence. Tumours were induced in 2 of 22 animals fed 1 ppb, and pathological lesions were present in the livers of 7 of the remaining survivors. VJG

43

Implication of mycotoxins for human health.
Campbell, T. C.; Stoloff, L.
Journal of Agricultural and Food Chemistry **22** (6) 1006-1015 (1974) [84 ref. En] [Dept. of Biochem. & Nutr., Virginia Polytechnic Inst. & St. Univ., Blacksburg, Virginia 24061, USA]

In a review on the risk to man from ingestion of aflatoxins from food, published data on comparative metabolism, primate studies, inadvertent human incidents and epidemiology are analysed. Data on the aflatoxin contamination of selected foods is presented and discussed. Other mycotoxins (sterigmatocystin, patulin, penicillic acid, trichothecenes, luteoskyrin, and citrinin) are also briefly mentioned. AL

44

An integrated distinguishing test for aflatoxin.
Shantha, T.; Murthy, V. S.; Parpia, H. A. B.
Journal of Food Science and Technology, India **11** (4) 194-196 (1974) [9 ref. En] [Central Food Tech. Res. Inst., Mysore, India]

A procedure is described to distinguish aflatoxin from non-specific fluorescent compounds. The method is based on the poor mobility of aflatoxin on TLC plates with diethyl ether as developing solvent and photo-decomposition of aflatoxins by UV light into slow moving and fast moving compounds on TLC. 2 tests, namely, preliminary development of the chromatograph with ether, and exposure of the spots to UV light prior to development with the methanol-chloroform solvent can be adopted as tests complementary to each other for distinguishing aflatoxin B_1 from other non-specific fluorescent compounds. VJG

45

Aflatoxin separation by high-pressure liquid chromatography.
Garner, R. C.
Journal of Chromatography 103 (1) 186-188 (1975) [11 ref. En] [Dept. of Expt. Pathol. & Cancer Res., Univ. of Leeds, 171 Woodhouse Lane, Leeds 2, Yorkshire, UK]

A method for complete and quantitative separation of the naturally occurring aflatoxins using a commercial high-pressure liquid chromatograph, which is nearly as sensitive as TLC methods, is reported. Retention times were extremely reproducible and each run took ≤10 min. The method should be applicable to the quantitative assay of aflatoxins in foods. AL

46

Further characterization of tissue distribution and metabolism of [^{14}C]aflatoxin B_1 in chickens.
Chipley, J. R.; Mabee, M. S.; Applegate, K. L.; Dreyfuss, M. S.
Applied Microbiology **28** (6) 1027-1029 (1974) [14 ref. En] [Dept. of Poultry Sci., Ohio St. Univ., Columbus, Ohio 43210, USA]

The distribution and metabolism of [^{14}C]aflatoxin B_1 in chicken tissues were investigated. Previously dried and frozen ethyl acetate extracts of liver, heart, gizzard, breast, leg, blood, and fecal samples were obtained from either layer or broiler chickens fed subclinical levels of [^{14}C]aflatoxin B_1. Treatment of these extracts with carboxypeptidase A, leucine aminopeptidase, pepsin, or trypsin revealed that an average of 50% of the ^{14}C detected in the acetate extracts was a liberated peptide (or amino acid) conjugate of

[^{14}C]aflatoxin B_{2a}. When a prepared standard of B_{2a} was made by incubation of B_1 with cold dilute aqueous HCl, the R_f values and absorbance maxima were identical with those of the tissue extracts after enzymatic treatment. AS

47

[Aflatoxin in foods on the Norwegian market.]
Yndestad, M.; Underdal, B.
Nordisk Veterinaermedicin 27 (1) 42-48 (1975) [41 ref. No, en] [Dept. of Food Hygiene, Vet. Coll. of Norway, PB 8146, Oslo Dep., Oslo 1, Norway]

A survey of the aflatoxin content in some food products available on the market in Norway is reported. During autumn 1973, samples of Brazil nuts, peanuts, peanut butter, hazelnuts, walnuts, mixed nuts, cocoa, cocoa products and dried milk were bought in stores in the Oslo area. In addition, samples of Brazil nuts and peanuts were taken from import stores. Aflatoxin was found in Brazil nuts, peanuts, walnuts, mixed nuts and cocoa. The frequency of aflatoxin-containing samples in these products varied from 2.5% in cocoa to 66.7% in Brazil nuts. In Brazil nuts, concn. of up to 4200 µg/kg of the B_1 toxin were found. 44% of the analysed Brazil nut samples exceeded the accepted tolerance limit of 5 µg/kg. In peanut butter, hazelnuts and dried milk, aflatoxin could not be detected. AS

48

Formation of aflatoxin derivatives on thin layer chromatographic plates.
Przybylski, W.
Journal of the Association of Official Analytical Chemists 58 (1) 163-164 (1975) [5 ref. En] [Food Res. Lab., Health and Welfare Canada, Ottawa, Ontario, Canada K1A OL2]

Rapid confirmation of the presence of aflatoxins B_1 and G_1 in foods is provided by reaction with trifluoroacetic acid at the origin of a TLC plate. The procedure has been used successfully with various nuts, grains, coffee and cocoa beans, and other foods. AS

49

Collaborative study of a method for chemical confirmation of the identity of aflatoxin.
Stack, M. E.; Pohland, A. E.
Journal of the Association of Official Analytical Chemists 58 (1) 110-113 (1975) [10 ref. En] [Div. of Chem. Physics, FDA, Washington, DC 20204, USA]

The chemical method for confirmation of the identity of aflatoxin by derivative formation directly on the TLC plate was studied collaboratively by 8 participants. The results show that aflatoxin B_1 was confirmed in 17 of 17 sample extracts representing 15 µg aflatoxin B_1/kg peanut butter, in 13 of 16 extracts representing 5 µg/kg, and in none of the 7 aflatoxin-free extracts. Collaborators commented that the method was easily performed and gave good results. The method has been adopted as official first action. AS

50

Self-protection of fermented foods against aflatoxin.
[Conference proceedings]
Djien, K. S.
IV International Congress of Food Science and Technology Abstracts of Papers, 206 (1974) [En] [Lab. of Food Microbiol. & Food Hygiene, Dept. of Food Sci., Agric. Univ., Wageningen, Netherlands]

During preparation of Indonesian fermented foods (ontjom from peanut press-cake and tempeh from soybeans) it was found that production of aflatoxin B_1 by Aspergillus flavus was considerably suppressed when grown with Neurospora spp. (peanut) and Rhizopus oligosporus (soybeans). This applied even with inoculation of Aspergillus spores at × 10 other mould spp. Little or no aflatoxin was detectable during the first 3 days incubation at 30°C. Accumulation of aflatoxin during traditional fermentation with a natural Asp. flavus infection is considered unlikely. ELC

51

Occurrence of aflatoxins and citrinin in groundnut (Arachis hypogaea L.) at harvest in relation to pod condition and kernel moisture content.
Subrahmanyam, P.; Rao, A. S.
Current Science 43 (22) 707-710 (1974) [16 ref. En] [Microbiol. Lab., Dept. of Botany, S. V. Univ., Tirupati 517502, Andhra Pradesh, India]

Groundnut pods were collected from fields on the day of harvest, graded into damaged and undamaged pods and kernel moisture was determined. A yellow pigment in some kernels, especially damaged pods, was identified as citrinin. Only Aspergillus flavus isolates were found to produce aflatoxins while isolates of Penicillium citrinum, P. jenseni and Asp. terreus produced citrinin. Aflatoxin and citrinin levels were high in kernels containing <30% moisture (rain-fed conditions), but little or no mycotoxin formation occurred when kernel moisture content was high (irrigation conditions). All damaged kernels were found to contain toxins. AL

52

The retarding effect of the antifungal agent pimaricin on the growth of Aspergillus species and aflatoxin production in raw ground peanuts.
[Conference proceedings]
Gelda, C. S.; Mathur, A. O.; Stersky, A. K.
IV International Congress of Food Science and Technology Abstracts of Papers 9a, 207 (1974) [En] [Ind. Lab. of Canada, Tillsonburg, Ontario, Canada]

Aspergillus parasiticus, known to produce toxin in peanut products, was found to be sensitive to the antifungal agent pimaricin. With inoculations of 70 Asp. parasiticus spores/g raw ground peanuts, pimaricin at concn. of 0, 5, 25 and 50 ppm progressively retarded mould growth and aflatoxin production after 1, 3, 5 and 11 days incubation at 25 ± 2°C. Mould growth and aflatoxin (B_1 G_1 and B_2 G_2) production were prevented completely by 50 ppm concn. for 11 days. ELC

53

Partition of aflatoxin during separation of different constituents of groundnut kernel.
Basappa, S. C.; Murthy, V. S.
Journal of Food Science and Technology, India **11** (4) 196-197 (1974) [5 ref. En] [Central Food Tech. Res. Inst., Mysore, India]

Investigations were carried out into the partition of aflatoxin between the oil and cake obtained from groundnut kernels in an oil mill and in a Carver laboratory hydraulic press. Representative samples of kernel and cake were collected from batches of kernels and analysed for aflatoxin content. Oil samples corresponding to a particular batch were collected. During oil separation in an expeller the bulk of the toxin present in the kernel will be in the cake. During oil separation by either process about 85-90% of aflatoxin present in groundnut kernels goes with the cake and 10-15% with the oil. VJG

54

Incidence of aflatoxin contamination in pecans. [Conference proceedings]
Koehler, P. E.; Escher, F. E.; Ayres, J. C.
IV International Congress of Food Science and Technology **Abstracts of Papers 9a**, 207 (1974) [En] [Dept. of Food Sci., Univ. of Georgia, Athens, Georgia 30602, USA]

Data are presented on the occurrence of moulds and the incidence of aflatoxin in pecan nuts entering commercial shelling plants. Only 10% of sound nuts had visible external mould contamination, but nearly 70% were contaminated internally. About 5% of nut meats were contaminated internally with Aspergillus flavus or Asp. parasiticus, but with wide variations (0 to 22%) between lots. Only 1 lot of 16 assayed contained detectable aflatoxin. ELC

55

Rapid screening method for aflatoxins and zearalenone in corn.
Thomas, F.; Eppley, R. M.; Trucksess, M. W.
Journal of the Association of Official Analytical Chemists 58 (1) 114-116 (1975) [11 ref. En] [Div. of Chem. and Physics, FDA, Washington, DC 20204, USA]

The methanol-water extraction system used in AOAC Method II for aflatoxins, extracts both the aflatoxins and zearalenone from corn. Using this methanol-water extraction system as a base, a rapid screening procedure has been developed for these mycotoxins. The methanol-water extract is defatted with hexane and the pigments are precipitated with copper carbonate. The aflatoxins and zearalenone are subsequently extracted into chloroform and are then detected by half-plate TLC. An elapsed time of about 1 h is required to analyse 1 sample. The sensitivity of the method is about 2 µg/kg for aflatoxin B_1 and 100 µg/kg for zearalenone. AS

56

Aflatoxin in central American cottonseed. [Conference proceedings]
Schneider, S.; Cabrera, S. de; Leon, R. de; Rolz, C.
IV International Congress of Food Science and Technology **Abstracts of Papers 9a**, 213 (1974) [En] [Div. de Investigacion Aplicada, Inst. Centroamericano de Investigacion y Technologia Ind., Apdo. Postal 1552, Guatemala]

Research on the incidence of aflatoxin in cottonseed in Central America attempted to evaluate the degree of danger that aflatoxin represents in one of the major high protein commodities in this tropical region. A survey of freshly ginned seed in the area indicated that aflatoxin was found in 4% of the samples. It was noted that poor quality seed permitted greater production of the toxin. The storage practices commonly used by oil extracting mills do not contribute to further aflatoxin production. AS

57

A preliminary work on the aflatoxin situation in some oil bearing crop samples (hazelnut, peanut, cottonseed and olive) in Turkey. [Conference proceedings]
Colakoglu, M.; Ünal, K.
IV International Congress of Food Science and Technology **Abstracts of Papers 9a**, 214 (1974) [En] [Dept. of Food & Fermentation Tech., Fac. of Agric., Univ. of Ege, Izmir, Turkey]

Examination for the presence of aflatoxin, using standard chromatography methods, were made (crop yr. 1967-1968) of 13 hazelnut samples and (crop yr 1968-1969) 20 peanut, 4 cottonseed and 1 olive samples. No aflatoxin was detected. Additions of pure aflatoxin B_1 to the samples at levels ≤ 4 ppb showed that this could be detected at the 4 ppb but not at 2 ppb level; it is concluded that the original samples contained no or <3 parts/billion aflatoxin. Samples which were sterilized, inoculated with Aspergillus flavus and stored for 21 days at 25°C and 98 ± 1% RH produced aflatoxin. ELC

58

[Detection and estimation of aflatoxin M_1 in milk.]
Lemieszek-Chodorowska, K.
Roczniki Panstwowego Zakladu Higieny 25 (5) 489-494 (1974) [20 ref. Pl, ru, en] [Panstwowy Zaklad Higieny, Warsaw, Poland]

The Celite method of Schuller & Verhülsdonk [National Institute of Public Health, Bilthoven, Netherlands], as yet unpublished and involving partition column chromatography followed by silica gel TLC, was applied to detection and estimation of aflatoxin M_1 in milk. For aflatoxin M_1 added to liquid milk at 0.025-10 µg/l., the limit of detection was found to be 0.05 µg/l. or 0.2 ng/TLC plate. No aflatoxin M_1 was detected by this method in 31 samples of liquid milk and 13 samples of spray-dried milk from different Polish dairy factories. SKK

59

Occurrence of aflatoxin residues in different tissues of young swine (piglets). [Conference proceedings]
Jemmali, M.; Murthy, T.
IV International Congress of Food Science and Technology **Abtracts of Papers 9a**, 218 (1974) [En] [Service Mycotoxines de la Sta. de Biochimie et Physicochimie des Cereales de l'INRA, 16 rue Nicolas Fortin, 75013 Paris, France]

Analysis of a naturally contaminated peanut meal which is generally incorporated in pig rations revealed an aflatoxin content of 1 to 3 ppm. Residues of aflatoxins B_1, B_2 and M in liver, kidney, spleen, heart, muscle and gall bladder were detected. The occurrence of toxin residues in feed and the tissues of piglets aged 80 days following ingestion of the ration for 19 to 35 days is considered as natural since pig husbandry practitioners were not aware of the contamination till the analysis had been made. Public health significance of the appearance of residues during short alimentary exposure of animals in early growth stages is discussed. AS

60

[Studies on the elimination of aflatoxin by various treatments.]
Lee, C. H.; Chung, Y. C.; Chung, Y.
Korean Journal of Food Science and Technology **5** (4) 201-205 (1973) [21 ref. Ko, en] [Soo Do Women's Teachers Coll., Seoul, Korea]

The effects of various pH conditions, or acid, alkali, and salt treatment for different temp. and time on the elimination of aflatoxins from foods were studied. Destruction was significantly increased by heat at the same pH levels. Treatment with 1, 5 and 10% NaOH or NH_3 at 20°C for 30 min completely eliminated aflatoxins, but only 40-80% were eliminated by treatment with 1, 5 or 10% acetic, hydrochloric or sulphuric acids. Aflatoxins were completely eliminated by treatment with bile acid at 37°C, 75% eliminated by artificial gastric juice at 37°C, and 39-55% eliminated by boiling at 100°C for 30 min in salt solution (0, 5, 10 and 20% concn.). [From En summ.] AL

61

Aflatoxin production of Aspergillus flavus isolates from rough rice, corn, soybean, peanut and copra.
Fandialan, I. M.; Ilag, L. L.
Philippine Agriculturist **57** (5/6) 254-263 (1973) [21 ref. En] [Dept. of Plant Pathol., UPLB Coll. of Agric., Philippines]

The amounts of aflatoxin produced by 5 isolates of Asp. flavus group from rough rice, corn, soybean, peanut and copra were determined. A comparison of the aflatoxin contents of the fungal growth and of the potato dextrose broth filtrate in which the isolates were grown for 8 days at 28°C, revealed that the mycelium with spores contained more aflatoxin than the broth filtrate. Cross inoculation studies showed that each isolate grew equally well in its native substrate and in the 4 other substrates. Aflatoxin production, however, varied with each particular inoculum-substrate combination. Rice appeared to be the best substrate for aflatoxin formation. Soybean supported good fungal growth but yielded from nil to minute amounts of aflatoxin. When inoculated in their respective native substrates, the most favourable temp. for aflatoxin production by the isolates from rough rice and corn was 30°C; the peanut and copra isolates, 25°C; and the soybean isolate, 20°C. AS

62

[Problems due to the presence of aflatoxin. Sampling of groundnut seeds and meal.]
Prevot, A.; Bloch, C.; Fatoux, P.; Henon, G.
Revue Francaise des Corps Gras **21** (10) 567-572 (1974) [5 ref. Fr, de, en, es] [Inst. des Corps Gras, Paris, France]

The effect of sampling methods on the detn. of aflatoxin in groundnuts and in groundnut meal was studied. 2 series of tests gave values of 100-600 parts/billion (ppb) SD 157, coeff. of variation (cv) 48.5%, and 1000-3125 ppb, SD 749, CV 39% for groundnuts. More representative sampling was achieved for meals with the following results for mean (ppb), SD, CV (%) respectively: pellets, 900, 124, 13.8; 743, 108, 14.5; 766, 59, 7.7; 688, 163, 23.7; 678, 112, 16.5; 1060, 119, 11%; finely ground meal, 140, 19, 13; coarse meals, 266, 70, 26.3; 1150, 346, 30. The results show the great difficulty in evaluating lots of peanuts. More accurate evaluation would require considerable outlay in labour, material and instrumentation. RM

63

Grain preservatives: effect on aflatoxin and ochratoxin production.
Vandegraft, E. E.; Heseltine, C. W.; Shotwell, O. L.
Cereal Chemistry **52** (1) 79-84 (1975) [10 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

Corn was treated with either 2% ammonia or 1% propionic acid. Both ammonia and propionic acid significantly reduced mould growth and subsequent aflatoxin and ochratoxin formation. Growth and the formation of mycotoxins were inhibited more by propionic acid than by ammonia. Both ammonia and propionic acid remained effective in inhibiting mould growth and aflatoxin production and in preventing ochratoxin production when treated corn stood as long as 19 and 29 wk, respectively, before inoculation. AS

64

Control of aflatoxin production during fermentation of wild rice.
Frank, J. F.; Torrey, G. S.; Marth, E. H.; Stuiber, D. A.; Lindsay, R. C.; Lund, D. B.
Journal of Milk and Food Technology 38 (2) 73-75 (1975) [11 ref. En] [Dept. of Food Sci., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

The effect of water content of wild rice on aflatoxin production by Aspergillus flavus growing in the rice during fermentation, and influence of processing steps as means to reduce aflatoxin contamination were investigated. Aflatoxin was either not detected or rarely observed during 31 days of storage when rice saturated with water or adjusted to contain 33% water was inoculated with spores of Asp. flavus and stored at 25°C. Detectable amounts of aflatoxin developed in rice maintained at 20% moisture. Aflatoxin B_1 content of contaminated fermented wet wild rice was reduced by parching. Aflatoxin analyses of hulls and kernels from parched rice indicated that most of the aflatoxin B_1 remained in the hulls; however, detectable amounts of aflatoxin B_1 were present in hulled rice kernels. When wild rice was sterilized with ethylene oxide, saturated with water, stored at 25°C, and inoculated with Asp. flavus, the mould grew if the rice was mixed daily, but only 10 parts/billion aflatoxin appeared after 19 days of storage. Asp. flavus did not grow in similarly treated rice that was not mixed. AS

65

[Aflatoxins in milk.] Zum Vorkommen von Aflatoxinen in Rohmilch. [Lecture]
Kiermerier, F.; Reinhardt, V.; Behringer, G.
Deutsche Lebensmittel-Rundschau 71 (1) 35-38 (1975) [35 ref. De, en, fr] [Chem. und Physikalisches Inst., Süddeutsche Versuchs- und Forschungsanstalt für Milchwirtschaft, Freising-Weihenstephan, Federal Republic of Germany]

Problems of contamination of milk with aflatoxins are discussed, on the basis of literature data. Aspects considered include: contamination of the feed with aflatoxins; transfer of aflatoxins from the feed to the milk; metabolism of aflatoxins; the occurrence and concn. of aflatoxins in milk in various countries; effect of storage and processing (e.g. pasteurization, drying) on the aflatoxin content of milk; and aflatoxins in other dairy products (including cream, butter and cheese). AJDW

66

[Biological and biochemical characteristics of toxinogenic moulds (Aspergillus flavus strains) isolated from food products.]
Burzynska, H.
Roczniki Panstwowego Zakladu Higieny 26 (1) 101-111 (1975) [20 ref. Pl, ru, en] [Panstwowy Zakladu Higieny, Warsaw, Poland]

67

[Production of aflatoxins by Aspergillus flavus group isolated from deteriorated rice in Korea.]
Lee, K.; Lee, S. R.
Korean Journal of Food Science and Technology 6 (3) 169-176 (1974) [53 ref. Ko, en] [Agric. Biochem. Lab., Korea Atomic Energy Res. Inst., Seoul, Korea]

In order to investigate the producibility of aflatoxins by 7 Aspergillus flavus strains isolated from deteriorated rice in Korea, polished rice was artificially inoculated and subjected to isolation and quantitation of the mycotoxin. All strains were capable of producing aflatoxins, preferentially B_1 but no G_1, and their producibility was closely related to the colour of culture media and chloroform extracts. The strain producing the most aflatoxin was A. flavus var. columnaris, excreting 1 ppm on rice. Aflatoxin B_1 was isolated and identified by TLC, UV absorption spectra and derivative formation of water and acetate adducts. AS

68

[Aflatoxin content of wine.] Untersuchungen zum Aflatoxingehalt von Weinen.
Lemperle, E.; Kerner, E.; Heizmann, R.
Wein-Wissenschaft 30 (2) 82-86 (1975) [10 ref. De] [St. Weinbauinst., Freiburg im Breisgau, Federal Republic of Germany]

500-ml samples of 150 Baden wines were examined by TLC for presence of aflatoxin. None was found in any of the samples. The sensitivity of the method was 0.4 ng and recovery was 80%. SKK

69

Distribution of aflatoxins in various fractions separated from raw peanuts and defatted peanut meal.
Natarajan, K. R.; Rhee, K. C.; Cater, C. M.; Mattil, K. F.
Journal of the American Oil Chemists' Society 52 (2) 44-47 (1975) [24 ref. En] [Food Protein Res. & Development Centre, Oilseed Products Div., Texas A&M Univ., College Station, Texas 77843, USA]

The majority of the aflatoxins originally present in the peanuts remained in the solid fractions, particularly the protein fraction, during wet-milling. In the protein concentrate preparation, the (i) concentrates carried 81-89% of the total toxin; (ii) crude oil, 5-8%; and (iii) whey fraction, 3-14%. In the case of protein isolate preparation, 51-56% of the total toxin remained with the isolates, 22-26% with (iv) the residue, 11-17% with (iii), and 7-8% with (ii) Distribution of aflatoxins in the preparation of protein isolates from defatted peanut meal showed that 55-65% of the total toxin originally present in the meal remained with the protein isolates, 20-28% with (iv), and 10-20% with (iii). Changes in extraction pHs for the preparation of protein isolates either from raw peanuts or defatted meal did not alter the above distribution pattern. A new approach based upon charge-transfer (electronacceptor-donor) complex formation is suggested to shift this aflatoxin distribution from protein products to disposable (iii) or (iv) fraction during the processing of raw peanuts and defatted meal for protein products. AS

70

[Method for detection of aflatoxin B_1 in cocoa beans.]
Czerwiecki, L.
Roczniki Panstwowego Zakladu Higieny **25** (6) 663-666 (1974) [7 ref. Pl, ru, en] [Zaklad Badania Zywnosci i Przedmiotow Uzytku Panstwowego Zakladu Higieny, Warsaw, Poland]

Cocoa beans defatted with petroleum ether were extracted with chloroform in Soxhlet apparatus. Theobromine was removed from the chloroform extracts with 25% silver nitrate. The extracts were purified subsequently on columns with silica gel. Aflatoxin was eluted with a methanol-chloroform mixture (3:97). The remaining residues were removed by freezing. TLC was used for identification and semiquantitative detn. of aflatoxin, using the UV fluorescence technique. The lowest detectable amount of aflatoxin B_1 with the method is 5 µg/kg. AS

71

Cleaning trials for corn containing aflatoxin.
Brekke, O. L.; Peplinski, A. J.; Griffin, E. L., Jr.
Cereal Chemistry **52** (2) 198-204 (1975) [11 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

Physical separation methods were generally ineffective for lowering the aflatoxin content of naturally contaminated corn used in the experimental work. The corn lots tested differed in aflatoxin content (10-450 parts/billion B_1), geographic source, content of broken corn-foreign material, and represented both white and yellow corn. Dry cleaning, wet cleaning, density separation, and preferential fragmentation of the grain were used in the laboratory tests. Aflatoxin was concentrated in broken corn-foreign material in only 1 of the 10 lots tested. Hand-selected kernels that outwardly appeared sound and free of the bright greenish-yellow fluorescence associated with presence of aflatoxin had the toxin in excess of current guidelines (20 parts/billion) in 6 out of 7 lots of corn. The hand-selected kernels contained about one-half to as little as one-tenth the level of aflatoxin in the unfractionated lot. AS

72

Pilot-plant dry milling of corn containing aflatoxin.
Brekke, O. L.; Peplinski, A. J.; Nelson, G. E. N.; Griffin, E. L., Jr.
Cereal Chemistry **52** (2) 205-211 (1975) [14 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

3 lots of corn (1 yellow, 2 white) naturally contaminated with different levels of aflatoxin (13, 160, and 510 parts/billion of B_1) were dry-milled to determine distribution of the toxin among product fractions. No problems were encountered in the milling steps. Product yields and fat contents were fairly typical of those for a normal dent corn. Aflatoxin level was always lowest in grits and highest in germ, hull, or degermer fines, and varied with contamination level of corn being milled. Proportion of aflatoxin B_1 in prime product mix (i.e., grits, low-fat meal, and low-fat flour) amounted to only 7-10% of total quantity of B_1 in all products. Concn. of aflatoxin in degermer fines, germ, and hull exceeded that of the corn milled. Aflatoxin B_1 level in endosperm-derived products correlated with their fat content. Yield of prime product mix, based on all products recovered, varied between 49 and 60% in these tests. AS

73

Aspergillus flavus and aflatoxin in preharvest corn from Indiana in 1971 and 1972.
Rambo, G. W.; Tuite, J.; Caldwell, R. W.
Cereal Chemistry **51** (6) 848-853 (1974) [14 ref. En] [Dept. of Botany & Plant Pathol., Purdue Univ., West Lafayette, Indiana 47907, USA]

This article was previously printed incorrectly when pages were transposed during production. It is reprinted here in entirety.

AL

74

[Prevention of mould growth on cheese during ripening.] [Lecture]
Dijcman, -. van
Alimentaria **11** (58) 43-44, 47 (1974) [Es]

The production of mycotoxins is discussed and the importance of the potential health hazards of mould growth on cheese is emphasized in addition to the financial losses and wastage involved. Standard methods of preventing mould growth are considered. Wrapping of cheese before ripening in plastics material is now an important method of preventing mould growth and retaining moisture, but possible disadvantages are high cost, liability to tearing and interference with normal ripening. The use of fungicides, preferably applied in a plastics emulsion which also retains moisture and permits good ripening is recommended; penetration of the fungicide, e.g. sorbic acid, is about 0.8 mm. ELC

75

Mycotoxin producing-potential of molds isolated from Cheddar cheese.
Bullerman, L. B.; Olivigni, F. J.
Journal of Food Science **39** (6) 1166-1168 (1974) [22 ref. En] [Dept. of Food Sci. & Tech., Univ. of Nebraska, Lincoln, Nebraska 68503, USA]

Surface mould counts of 7 brands of Cheddar cheese were generally higher at 21° than at 5°C; they ranged (per g surface material) from 'none detected' to 1440 and from 6 to 3190 at the 2 temp. respectively in aged cheeses, and from 5 to 3380 and 7 to 3500 in mild cheeses. Moderate to very extensive mould coverage became visible within 6 wk at 5°C, except in the case of 1 cheese which had been treated with potassium sorbate. Mould counts of 2 brands of shredded Cheddar cheese were very low at both temp. A total of 349 isolates were predominantly Penicillium spp. (287 isolates) and Aspergillus spp. (23); 29.5 and 47.8% of the isolates of these 2 genera respectively were toxic to chicken embryos, and 21.6 and 21.7% were toxic to Bacillus megaterium. All the toxinogenic aspergilli were from plates incubated at 21°C, whereas >50% of the toxinogenic penicillia were from plates incubated at 5°C. No tests were made to determine whether toxins had been produced by the organisms whilst growing in the cheese. CDP

76

Improvement in the thin-layer chromatography of natural producs. I. Thin-layer chromatography of the aflatoxins.
Heathcote, J. G.; Hibbert, J. R.
Journal of Chromatography **108** (1) 131-140 (1975) [14 ref. En] [Univ. of Salford, Salford, UK]

During the period which has elapsed since aflatoxins were first isolated, one of the main problems has been separation of individual aflatoxins in pure form from aflatoxin-containing extracts. This separation has been best effected by TLC, and this paper describes how some of the difficulties may be overcome by using an appropriate combination of solvent system and silica gel preparation. For examination of aflatoxin-containing extracts from mycelia of Aspergillus flavus, an initial freeze-drying step has been found to improve appreciably the quality of the chromatograms obtained. AS

77

[Effects of preservatives on aflatoxin formation by Aspergilous flavus.] Über den Einfluss von Konservierungsmitteln auf die Aflatoxinbildung durch Aspergillus flavus.
Elbereir, M.; Krug, G.; Grunert, K. S.; Franzke, C
Nahrung **19** (1) K3-K4 (1975) [2 ref. De] [Hygiene-Inst., Berlin (West)]

Spores of aflatoxin-forming Aspergillus flavus strains were inoculated onto agar plates containing preservatives (p-hydroxybenzoic acid esters, benzoic acid, sorbic acid, sorboyl palmitate or potassium sorbate) at concn. ≤2000 ppm. Control plates contained no preservatives. The inoculated plates were incubated at 30°C for 3 days then held for ≤5 months at room temp. Growth of A. flavus and formation of aflatoxins were studied at intervals. All the preservatives studied inhibited both growth and aflatoxin formation; toxin formation was significantly reduced at doses at which no detectable inhibition of growth was observed. p-Hydroxybenzoic acid showed the strongest inhibitory activity, followed by sorbic acid, benzoic acid and potassium sorbate (in order of decreasing inhibitory activity). No details are given of the relative inhibitory activity of sorboyl palmitate. AJDW

78

Ammonium hydroxide treatment of aflatoxin B_1. Some chemical characteristics and biological effects.
Vesonder, R. F.; Beckwith, A. C.; Ciegler, A.; Dimler, R. J.
Journal of Agricultural and Food Chemistry **23** (2) 242-243 (1975) [7 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

When a mixture of aflatoxin B_1 and ammonium hydroxide is stirred at room temp. for 21 h, aflatoxin B_1 is obtained after acidification and chloroform extraction. When a similar reaction mixture is stirred at room temp. for 8, 10, 11, 14, and 18 days, drying on a rotary evaporator at 60° yields a brown product, which upon acetone extraction gives a mixture of substituted o-coumaric acid and aflatoxin B_1 as evidenced by IR and UV spectroscopy. The brown residue is nontoxic in a chick embryo bioassay. AS

79

Aflatoxin B_1 hydroxylation by hepatic microsomal preparation from the rhesus monkey.
Krieger, R. I.; Salhab, A. S.; Dalezios, J. I.; Hsieh, D. P. H.
Food and Cosmetics Toxicology **13** (2) 211-219 (1975) [21 ref. En] [Dept. of Environmental Toxicol., Univ. of California, Davis, California 95616, USA]

Aflatoxin B_1 is a hepatocarcinogen in certain animals and possibly in man. Its hydroxylation to aflatoxin Q_1 and aflatoxin M_1 is catalysed by hepatic microsomal mixed-function oxidases from the rhesus monkey and is accompanied by the formation of 3 unidentified organosoluble metabolites. The basis biochemical properties of this monkey liver enzyme system are reported. The results of this study are discussed in relation to the hepatocarcinogenic potency of aflatoxin B_1 in the rhesus monkey and man. VJG

80

[Manioc flour in Mozambique.]
Mota, T. P.; Lourenco, M. C.
Agronomia Mocambicana **8** (1) 47-59 (1974) [37 ref. Es, en, fr]

Results are tabulated of chemical and microbiological examination of 26 samples of manioc (cassava) flour representing different grades and localities of production and consumption in Mozambique; manioc being the staple food of 50% of the population. Analytical results for contents of moisture, ash, protein, ether extract, starch, fibre and acidity confirmed other literature data. Microbiological quality was poor, probably resulting from primitive methods of flour extraction and handling. Data include counts of mesophilic and thermophilic aerobes (total and spore counts), sulphite-reducing organisms, coliforms, Salmonellae, coagulase-positive staphylococci and moulds. Salmonella spp. were absent, but most samples contained Streptococcus faecalis and 3 contained Staphylococcus aureus. The most serious aspect was the high content of aflatoxin B_1 (range, 0.50-4.61 ppm), which was present in 22 of the samples and exceeded the safe limits for human consumption in many samples. Rapid mould growth occurs on manioc root stored under humid conditions. ELC

81

An investigation of the fluorescent properties of aflatoxin infected pecans.

Tyson, T. W.; Clark, R. L.

Transactions of the ASAE **17** (5) 942-944, 948 (1974) [9 ref. En] [S. Carolina Electric-Gas Co., Waterboro, S. Carolina, USA]

The relation between fluorescent properties and aflatoxin content of pecan halves was studied. In experiments with 150 sound mature pecan halves, a strong relation was found between fluorescence ratio at 440 and 490 nm of the bottom (innermost) half i.e. BOT 440/490 and aflatoxin content of pecan halves soaked in chloroform - aflatoxin solutions of 0.095-95 ppm: BOT 440/450 = 0.8158 + 0.0619 aflatoxin content (0-20 ppm), r = 0.855. The relation between fluorescence ratio and total aflatoxin content of halves inoculated with Aspergillus flavus was best expressed by: BOT 450/490 = 0.7032 + 0.0358 kg total aflatoxin concn. (0-5000 ppm), r = 0.462. Fluorescence ratios thus allowed detection of pecan halves with >20 ppm aflatoxin with 90% confidence. RM

82

[Studies on moisture content/relative humidity relationship in microflora and production of aflatoxin in soybean flakes.]

Costa, M. R. S. da; Leitao, M. F. F.; Costa, S. I. da

Coletanea do Instituto de Tecnologia de Alimentos **5**, 95-106 (1973/1974) [10 ref. Pt, en]

Soybean flakes were stored at ambient temp. (24-28.5°C) and RH of 10-90% and aflatoxin was determined in samples showing visible fungal contamination during 3 months' storage. Max. safe moisture content was 9.5% (wet basis), reached at 27°C, RH 70%. At RH <75% the product had a low equilibrium moisture content. The main fungi isolated were Aspergillus and Penicillium spp. No xerophytic species were observed. No aflatoxin was formed at moisture contents <12.5% (wet basis). No toxigenic species were observed at ⩽80% RH. Under the conditions prevalent in Brazil, protective water-vapour-proof packaging is recommended for ⩾1 wk storage at 90%, ⩾2 wk at 85%, ⩾4 wk at 80% and ⩾8 wk at 75% RH. RM

83

[Trial of elimination of aflatoxin in groundnuts by physical methods.] [Lecture]

Bockelee-Morvan, A.; Gillier, P.

Oleagineux **29** (11) 513-516 (1974) [Fr, en, es]

9 lots of 50-400 kg samples of pods were hand sorted into the following groups: good, split, broken, pierced, gnawed by termites or black end pods. Intact pods were 56-92% (mean 73%) of the total, with mean aflatoxin content of unsorted lot 24%. Only lots with relatively low aflatoxin content before sorting yielded 0-<5 parts/billion after sorting. Pierced pods (generally by millipedes) accounted for 4.3% of pods but 40% aflatoxin. In seed sorting trials, perfect seeds were separated from (i) unripe, wrinkled seeds, (ii) seeds showing signs of mould attack, (iii) broken or skinned seeds, (iv) seeds of abnormal colour. Of 30.7% defective seeds from 4 lots, (i) (ii) (iii) and (iv) accounted for 3.0, 88.2, 0.6 and 8.2% respectively of total aflatoxin, 37.6, 12.0, 41.3 and 9.1% of abnormal seeds in the unsorted lot and contained 7.9, 740 [?], 1.5 and 90 parts of aflatoxin in relation to the total for the random lot (=100). Sorting of categories (i), (ii) and (iv), or 18% of all seeds, produced almost completely aflatoxin-free lots. The criteria used for hand-sorting can be used for designing industrial sorting methods e.g. pneumatic shelling and grading, and electronic sorting of abnormally coloured seeds. RM

84

[Antimicrobial activity of pimaricin, benzoate, propionate, sorbate and nitrite on aflatoxin-producing strains.]

Vicini, E.; Paini, L.; Casolari, A.

Industria Conserve **49** (3) 173-175 (1974) [25 ref. It, de, en, fr] [Sta. Sperimentale per l'Ind. delle Conserve Alimentari, Parma, Italy]

The activity of pimaricin (an antibiotic isolated from Streptomyces natalensis) against the toxigenic strains Aspergillus flavus NRRL A- 16100 and A. parasiticus NRRL 2999 and 3000 was investigated in vitro. Resistance of the 3 strains to pimaricin by the inhibition zone method was A. flavus > A. parasiticus 2999 > A. parasiticus 3000. Sodium benzoate (1500 ppm) and potassium sorbate (2000 ppm) also completely inhibition the 3 strains. Propionate (2000 ppm) was completely inactive and $NaNO_2$ (150 ppm) was only active against A. parasiticus. Results showed that pimaricin acts at 30-100 times lower concn. on 10 times higher spore counts and could with advantage be used for food preservation. RM

85

Mycotoxins in food.

Jarvis, B.

Scientific and Technical Surveys, British Food Manufacturing Industries Research Association No. 83, 20pp. (1974) [66 ref. En] Price £1.50 [British Food Manufacturing Ind. Res. Assoc., Randalls Rd., Leatherhead, Surrey, UK]

This survey forms the basis of a paper presented to the summer conference of the Society of Applied Bacteriology on 'Recent trends in food and agriculture' held at the Univ. of Aberdeen, Scotland in July 1974. The information is arranged under the following headings: Mycotoxins in stored agricultural products (cereals, nuts and oilseeds, and cheese) (pp. 4-8); Mycotoxins in mould-spoiled foods (pp. 8-9); Mycotoxins in animal products (pp. 9-12); Mycotoxins in mould-ripened foods (meat products and cheese) (pp. 12-14); Mycotoxins in fermentation products intended for food use (pp. 14-15); and Control of mycotoxins in foods (pp. 15-16). VJG

86

[Qualitative and quantitative determination of aflatoxins B_1 and G_1 in foods.] Beitrag zur qualitativen und quantitativen Bestimmung von Aflatoxin B_1 und G_1 in Lebensmitteln.
Krug, G.; Teichmann, B.
Nahrung **19** (3) 255-266 (1975) [11 ref. De, en, ru] [Hygiene-Inst., Berlin (West)]

A method for detection and semiquantitative determination of aflatoxins B_1 and G_1 in foods is described. Food samples are comminuted and defatted; aflatoxins are then extracted with a chloroform/methanol/water (80:10:1030) mixture, the extract is evaporated to dryness, and the dry residue dissolved in chloroform. This solution is then separated by 2-dimensional TLC on Kieselgel G, using ether for separation of lipids and interfering substances and a chloroform/methanol (97:3) mixture for separation of aflatoxins. Aflatoxin spots are detected by UV fluorescence. A method for semi-quantitative detn. of the separated aflatoxins is described, based on progressive dilution until UV fluorescence is no longer detectable. Detection limit is 0.4 ng for aflatoxin B_1 and 0.3 ng for aflatoxin G_1. Confirmation of the identity of the aflatoxins by UV and fluorescence spectrophotometry (using a quinine sulphate standard) is described. Studies on aflatoxin-containing groundnut meal showed the reproducibility of the method to be acceptable. AJDW

87

Aflatoxin and other mycotoxins.
Waart, J. de
Voedingsmiddelentechnologie **8** (11) 14-17 (1975) [13 ref. En] [CIVO-TNO, Zeist, Netherlands]

This paper includes data for the source, structure, occurrence, toxicity and physical properties of various mycotoxins presenting a significant health hazard, including aflatoxins, patulin, sterigmatocystin, ochratoxins, sporofusariogenin and stachybotryotoxin. AJDW

88

[The problem of mycotoxins in foods and beverages.] Das Mykotoxinproblem bei Lebensmitteln und Getränken. [Lecture]
Frank, H. K.
Zentralblatt für Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, IB **159** (4) 324-334 (1974) [23 ref. De, en] [Bundesforschungsanstalt für Lebensmittelfrischhaltung, Karlsruhe, Federal Republic of Germany]

Mycotoxin formation by numerous kinds of microfungi is considered in this lecture; brief information on some 40 toxinogenic fungi, their mycotoxins and most important morbid effects is tabulated; and the public health importance of mycotoxins (attention being given to milk in infant nutrition), max. tolerances in foods and beverages, destruction or removal of mycotoxins, and preventive measures are discussed. SKK

89

Effect of sterculic acid upon aflatoxicosis in rats fed diets containing saturated [beef fat] and unsaturated fat [corn oil].
Wells, P.; Aftergood, L.; Alfin-Slater, R. B.; Straus, R.
Journal of the American Oil Chemists' Society **51** (10) 456-460 (1974) [25 ref. En] [School of Public Health, Providence Hospital, Portland, Oregon 97213, USA]

90

Induction of cholangiocarcinoma following treatment of a rhesus monkey with aflatoxin.
Tilak, T. B. G.
Food and Cosmetics Toxicology **13** (2) 247-249 (1975) [10 ref. En] [Dept. of Pathol., Nat. Inst. of Nutr., Indian Council of Med. Res., Hyderabad - 500007, India]

Aflatoxin was administered to a female rhesus monkey over a period of 5 yr, partly by intramuscular injection but primarily by oral intubation. The monkey developed a metastasizing intrahepatic bile-duct carcinoma, which was detected at autopsy 5.25 yr after toxin administration was discontinued. These observations in non-human primates lend increasing support to the concept that aflatoxin consumption is possibly related to human primary liver cancer in some areas, and underlines the need for a constant review of the so-called 'safe' limits of these toxins in human diets. VJG

91

[Symposium: mycotoxins.] Symposium: Mykotoxine. [Conference proceedings]
Frank, H. K. **(Germany, Federal Republic of, Bundesforschungsanstalt für Lebensmittelfrischhaltung)** (Editor)
Berichte der Bundesforschungsanstalt für Lebensmittelfrischhaltung No. 1, 54pp. (1973) [De] [Bundesforschungsanstalt für Lebensmittelfrischhaltung, Engesserstrasse 20, D-7500 Karlsruhe, Federal Republic of Germany]

This report contains summaries of papers presented at the above symposium, organized by the Federal Research Centre for Food Preservation, held at Karlsruhe on 5 Oct. 1972. They include: Introduction to the problem of mycotoxins, by H. K. Frank (pp. 9-12, 11 ref.); Aflatoxins in foods and raw materials and in the manufacture of foods, by E. Hanssen & M. Jung (pp. 17-21, 22 ref.); Mycotoxins in milk and milk products, by F. Kiermeier (pp. 21-23, 11 ref.); Mycotoxins in meat and meat products, by L. Leistner & H.-J. Mintzlaff (pp. 24-27, 15 ref.); Aflatoxin effects in animals and man, by H. Bösenberg (pp. 28-31, 12 ref.); The influence of mycotoxins on plants, by J. Reiss (pp. 32-36, 24 ref.); Biosynthesis of mycotoxins, by H. J. Rehm (pp. 36-38, 4 ref.); and Conditions of the formation of some carcinogenic mycotoxins, by R. Orth (pp. 39-45, 14 ref.). An appendix shows the structural formulae of 13 mycotoxins, and gives 15 further references. AL

92

Aflatoxin production in Aspergillus flavus inoculated ears of corn grown at diverse locations.
Lillehoj, E. B.; Kwolek, W. F.; Vandegraft, E. E.; Zuber, M. S.; Calvert, O. H.; Widstrom, N.; Futrell M. C.; Bockholt, A. J.
Crop Science **15** (2) 267-270 (1975) [22 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

Normal and opaque-2 endosperm counterparts of 2 Zea mays L. hybrids were grown during 1973 in Illinois, Missouri, Georgia, and Texas; 20 days after silking test ears were inoculated with Asp. flavus spores. Other ears were mechanically damaged or untreated. Sample ears were harvested 15, 30, 45, and 70 days after treatment. After shelling the corn was ground, examined for bright-greenish yellos (BGY) fluorescence, and assayed for aflatoxin. The number of aflatoxin-positives in 128 inoculated ears/plot increased generally from North to South; Illinois 28; Missouri 86; Texas 111; and Georgia 117. Mean levels of aflatoxin B_1 in toxin-contaminated ears showed a similar geographical pattern: Illinois, 2.4 ppb (parts/billion); Missouri, 22.5 ppb; Texas, 114.5 ppb; and Georgia 133.9 ppb. Almost all toxin production occurred during the initial 30 days after inoculation. Fewer toxin-contaminated ears were found in doublecross hybrid than in single cross, but no significant difference in aflatoxin incidence was observed between endosperm types (normal vs. opaque). 60 of 512 damaged uninoculated ears and 21 of 512 untreated control ears contained aflatoxin; 80% of aflatoxin-positive associated with physically damaged or control ears were observed in corn from Georgia. AS

93

Fungi and aflatoxin in a bin of stored white maize.
Lillehoj, E. B.; Fennel, D. I.; Hara, S.
Journal of Stored Products Research **11** (1) 47-51 (1975) [9 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

Samples of maize from discoloured spots in the surface layer of stored grain in a bin were examined for variation in microbial profile and for the presence of aflatoxin. Comparisons were made with samples of non-discoloured maize from the same bin. Deteriorated test kernels showed a high incidence of Penicillium, Absidia, Mucor, Rhizopus and Fusarium spp., as well as bacteria and yeasts. Aspergillus species were also frequently observed; Asp. flavus was the most common species in this group. In one sample of discoloured maize 80% of the kernels contained Asp. flavus and the sample had 0.40 ppm aflatoxin B_1. Other fractions exhibited extensive discolouration but no aflatoxin. AS

94

[Behaviour of aflatoxin during production of processed cheese.] Über das Schicksal des Aflatoxins bei der Schmelzkäseherstellung.
Kiermeier, F.; Rumpf, S.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **157** (4) 211-216 (1975) [12 ref. De, en] [Milchwissenschaftliches Inst., Tech. Univ., Munich, Federal Republic of Germany]

Aflatoxin in processed cheese was determined by solution of the cheese in 6M urea, TLC of a chloroform extract of the fat- and protein-freed solution, and fluorimetric estimation of the separated aflatoxins. Limit of detection for aflatoxins B_1 and G_1 were 0.5×10^{-4} ppm. Aflatoxin, although of fairly frequent occurrence in unprocessed cheese was found in only 2 of 115 processed cheeses examined. Destruction by processing seems to be excluded however, since losses of the toxin exposed in aqueous solution to typical processing conditions of heating, emulsifying salt concn. and pH were low (<5%). Its general absence from processed cheese results perhaps from preprocessing cleaning and trimming of the cheeses used and variation in their degree of ripening. GTP

95

Studies on the recovery of aflatoxin B_1 injected into frozen beef at different intervals of storage.
Murthy, T. R. K.; Jemmali, M.; Rosset, R.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **158** (1) 5-7 (1975) [13 ref. En, de] [Sta. de Biochimie et Physico-Chimie des Cereales, INRA (Service des Mycotoxines), Paris, France]

Beef stored at -18°C for 20, 25, 32, 153, and 183 days showed a gradual diminution in the recovery of injected aflatoxin B_1 with increasing storage time (e.g. 97.78% recovery at 20 days, 78.8% at 183 days). Passage of aflatoxin into the ether and hexane fractions of the silica gel column was noted Ether fraction contained an aflatoxin B_1-like substance. Probable occlusion of aflatoxin B_1 to meat constituents due to physico-chemical changes in muscle during storage is discussed. AS

96

Quantitative fluorodensitometric determination and survey of aflatoxins in nutmeg.
Beljaars, P. R.; Schumans, J. C. H. M.; Koken, P. J.
Journal of the Association of Official Analytical Chemists **58** (2) 263-271 (1975) [16 ref. En] [Food Inspection Service, Florijnruwe 111, Maastricht, Netherlands]

Samples were extracted with chloroform, followed by silica gel column cleanup according to the AOAC official first action method, 26.019 (a), and by 2-dimensional TLC according to the antidiagonal technique. Concn. of aflatoxins in samples were determined by measurement of the fluorescent intensities of the separated aflatoxin spots from sample and standards on the same chromatoplate with a reflectance flying-spot densitometer. With such a technique, a coeff. of variation value of 5.22±1.24% (P = 99%) was calculated for a series of 5 standard B_1 spots and averaged for 13 TLC plates, demonstrating the precision of the chromatographic and densitometric procedures. An average recovery of 108.4±5.8% (P = 95%) was obtained for 11 spiked nutmeg extracts (5.0-20.0

μg B_1 added/kg), whereas an average recovery of 92.6±4.9 (P = 95%) was established for 13 spiked nutmeg samples (5.0-20.0 μg B_1 added/kg). The coeff. of variation of the complete analytical procedure for ground nutmeg was 8.80%. Aflatoxins were detected in the Netherlands in 30 of 40 samples of ground nutmeg, whereas no aflatoxins were present in whole nutmeg kernels (8 samples analysed). The lowest level of detection was 1.0 μg B_1/kg. No aflatoxins were detected in 50 commercial spices assayed according to the same procedure, with the exception of 1 sample of bay leaf which contained 5.1 μg B_1/kg. AS

97

High speed liquid chromatography of pesticides. [Review]
Moye, H. A.
Journal of Chromatographic Science **13** (6) 268-279 (1975) [37 ref. En] [Food Sci. Dept., Univ. of Florida, Gainesville, Florida 32611, USA]

This article provides a literature review, reports on recent advances in the author's laboratory, and suggests possible types of pesticide analyses where high speed liquid chromatography may be applied. Brief reference is made of applications to aflatoxins, milk, meat, citrus fruit extracts, etc. Columns and detectors are discussed. AL

98

[Moulds as indicators in product testing.]
Schimmelpilze als Indikatoren bei der Warenprüfung.
Stantschew, W. [Stanchev, V.]
Lebensmittel-Industrie **22** (3) 110 (1975) [De, en, ru] [D. Blagoev Coll., Varna, Bulgaria]

The use of the mould microflora (counts and species present) as an indicator of the quality of foods is discussed, with reference to: evaluation of the danger of spoilage; the mould microflora as an indicator of the storage and transport conditions to which the food has been subjected; detection of toxigenic moulds; prediction of shelf-life; determination of the optimal storage and transport conditions; and detection of changes in the product altering its uses. AJDW

99

[Mycotoxins in fatty products.] [Review]
Vitali, G.
Industrie Alimentari **14** (2) 58-63 (1975) [18 ref It, en] [Istituto Tec. Comm. 'A. Bordoni, Pavia, Italy]

This review deals with aflatoxins, ochratoxins and sterigmatocystins; presence of mycotoxins, aflatoxins in particular, in vegetable oils and milk and milk products; aflatoxicosis in man and animals; and mycotoxin determination. SKK

100

Effect of dietary fat upon aflatoxicosis in rats fed Torula yeast containing diet.
Wells, P.; Aftergood, L.; Parkin, L.; Alfin-Slater, R. B.
Journal of the American Oil Chemists' Society **52** (5) 139-143 (1975) [19 ref. En] [School of Public Health, Univ. of California, Los Angeles, California 90024, USA]

101

[Aflatoxins.] [Review]
Tango, J. S.
Boletim do Instituto de Tecnologia de Alimentos, Brazil No. 37, 37-95 (1974) [34 ref. Pt]

Aspects considered in this review on aflatoxins include: the structure of the various aflatoxins; mould spp. forming aflatoxins; factors influencing aflatoxin formation (substrate, moisture content, temp., storage time, physical damage of the stored commodity, O_2 and CO_2 concn., interaction with other microorganisms); aflatoxins in groundnuts, groundnut press cake, groundnut oil and groundnut husks; chemical and biological methods for detn. of aflatoxins; susceptibility of various domestic animals to poisoning by aflatoxins; and methods for detoxification of feeds and foods containing aflatoxins. AJDW

102

Production of aflatoxin and its partition between the medium and the mycelium of Aspergillus parasiticus during incubation under various conditions.
Shih, C.-N.; Marth, E. H.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **158** (4) 215-224 (1975) [10 ref. En, de] [Dept. of Food Sci., Univ of Wisconsin, Madison, Wisconsin, USA]

103

Screening method for the detection of aflatoxins in mixed feeds and other agricultural commodities with subsequent confirmation and quantitative measurement of aflatoxins in positive samples.
Romer, T. R.
Journal of the Association of Official Analytical Chemists **58** (3) 500-506 (1975) [6 ref. En] [Ralston Purina Co., 835 S. Eighth St., St. Louis, Missouri 63188, USA]

The method described will detect total aflatoxins (B_1, B_2, G_1, G_2) in mixed feeds, grains, nuts, and fruit products in samples containing as little as 5-15 μg/kg. In addition, the presence of aflatoxins in positive samples can be confirmed and the toxins can be quantitatively measured, using the same extract as that used for screening. In the screening method, aflatoxins are extracted with acetone-water (85 + 15), and interferences are removed by adding cupric carbonate and ferric chloride gel. The aflatoxins are extracted from the aqueous phase with chloroform and the chloroform extract is washed with a basic aqueous solution. A Velasco-type minicolumn is used to further purify the extract and capture the aflatoxins in a tight band. The screening method has been successfully applied to 24 different agricultural commodities. Quantitative TLC was also performed with extracts of each of these commodities. An average recovery of 94% B_1, 108% B_2, 130% G_1, and 103% G_2 was obtained compared to the official final action AOAC method for cotton-seed products, 26.048-26.056. Within-laboratory coeff. of variation of 10-15% were obtained for each of the aflatoxins and total aflatoxins in a sample of peanut meal naturally contaminated with 11 μg B_1 + 3 μg B_2 + 11 μg G_1 + 5 μg G_2/kg. AS

104

Tremorgenic mycotoxins from Aspergillus caespitosus.

Schroeder, H. W.; Cole, R. J.; Hein, H., Jr.; Kirksey, J. W.

Applied Microbiology 29 (6) 857-858 (1975) [3 ref. En] [ARS, Southern Region, College Station, Texas 77840, USA]

2 tremorgenic mycotoxins were isolated from Aspergillus caespitosus, and identified as verruculogen and fumitremorgin B. They were produced at the rate of 172 and 325 mg/kg, respectively, on autoclaved cracked field corn. AS

105

Destruction of aflatoxins in peanut protein isolates by sodium hypochlorite.

Natarajan, K. R.; Rhee, K. C.; Cater, C. M.; Mattil, K. F.

Journal of the American Oil Chemists' Society **52** (5) 160-163 (1975) [28 ref. En] [Oilseed Products Div., Food Protein Res. & Development Center, Texas A&M Univ., College Station, Texas 77843, USA]

Sodium hypochlorite (i) has been tested for destruction of aflatoxins during the preparation of peanut protein isolates from raw peanuts and defatted peanut meal. The treatments were evaluated by determination of the aflatoxins in the products by TLC. Effects of (i) concn., reaction pH, temp. and time were studied. Results show that both the (i) concn. and pH are important factors in reducing the concn. of aflatoxins in the protein isolates to nondetectable levels. The treatment with 0.4% (i) at pH 8 produced protein isolates with trace amounts of aflatoxins B_1 and B_2 from ground raw peanuts containing 725 parts/billion (ppb) aflatoxin B_1 and 148 ppb aflatoxin B_2, whereas untreated protein isolates contained 384 ppb aflatoxin B_1 and 76 ppb aflatoxin B_2. At pH 9, 0.3% (i) reduced the aflatoxin B_1 content in the protein isolates from 300 ppb to below detectable quantities and the aflatoxin B_2 content from 52 ppb to 2 ppb. Similar results were obtained at pH 10 for 0.3% (i) concn. In the case of defatted peanut meal which contained 136 ppb aflatoxin B_1 and 36 ppb aflatoxin B_2, 0.25% (i) concn. at pH 8 (0.20% at pH 9; 0.15% at pH 10) reduced both the aflatoxin B_1 and B_2 contents to below detectable quantities in protein isolates as compared to aflatoxin levels of approx. 75 ppb B_1 and 17 ppb B_2 in the untreated protein isolates. Reaction temp. and time did not affect the destruction of aflatoxins significantly. AS

106

Stability of aflatoxin B_1 and ochratoxin A in brewing.

Chu, F. S.; Chang, C. C.; Ashoor, S. H.; Prentice, N.

Applied Microbiology **29** (3) 313-316 (1975) [16 ref. En] [Food Res. Inst., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

The stability of aflatoxin B_1 and ochratoxin A in brewing was investigated by adding the purified toxins to raw materials at 1 and 10 μg/g levels during mashing in a conventional micro-brewing process. The results indicate that both toxins are stable to heat and are insensitive to cooker mash treatment. Both mycotoxins were partially removed in mashing and brewing processes. About 14-18% and 27-28% of added toxins were found in final beers brewed from starting materials containing 1 and 10 μg, respectively, of either toxin/g. The possible route of transmission of mycotoxins into beer is discussed. AS

107

Incidence of aflatoxin in California almonds.

Schade, J. E.; McGreevy, K.; King, A. D., Jr.; Mackey, B.; Fuller, G.

Applied Microbiology **29** (1) 48-53 (1975) [12 ref. En] [W. Regional Res. Lab., USDA, Berkeley, California 94710, USA]

In a survey of California almonds, aflatoxin (Af) was found in 14% of 74 samples of unsorted, in-shell almonds as received by the processor in 1972, but occurred at very low levels (below 20 parts/billion [ppb]) in 90% of contaminated samples. The overa proportion of individual nuts contaminated was especially low and is estimated with 95% probabili to have been in the range 1 nut/55 300 nuts-1 nut/14 700 nuts. Af contamination is not restricted to any particular section of the almond-growing region of California. Commercial sorting procedures are effective in removing most Af-contaminated nutmeats, since 0 of 26 samples of processed, whole nutmeats contained Af. In contrast, 13 of 27 samples of diced almonds were contaminated, but 9 of these 13 contained <20 ppb. Only 1 of 25 samples of sliced nutmeats contained Af (4 ppb). Thus, Af incidence in almonds varies greatly with the category of finished product. The apparent high incidence in diced nutmeats is probably due mostly to the more uniform distribution of Af in this product (because of its small particle size) than that occurring in the other products. Sample size requirements for monitoring Af in almonds are discussed. AS

108

Mycotoxin-producing potential of mold flora of dried beans.

Mislivec, P. B.; Dieter, C. T.; Bruce, V. R.

Applied Microbiology **29** (4) 522-526 (1975) [24 ref. En] [Div. of Microbiol., FDA, Washington, DC 20204, USA]

To evaluate the potential for mycotoxin production by moulds in dried beans, the mould flora of 114 samples was determined both before and after surface disinfection of the beans with 5% NaOCl. Surface disinfection substantially reduced mould incidence, indicating that contamination was mainly on the surface. The flora, both before and after disinfection, was dominated by species of the Aspergillus glaucus group, the toxicogenic species Asp. ochraceus, Penicillium cyclopium, and P. viridicatum, and species of Alternaria, Cladosporium, and Fusarium. The toxicogenic species Asp. flavus, Asp. versicolor, Penicillium citrinum, P. expansum, P. islandicum, and P. urticae were encountered less frequently. Of 209 species of Aspergillus and Penicillium screened for mycotoxin production on sterile rice substrate, 114 produced ≥1 of the following mycotoxins: Asp. flavus, aflatoxins; Asp. ochraceus, ochratoxins; Asp. nidulans, Asp. unguis, and Asp. versicolor, sterigmatocystin; P. cyclopium, penicillic acid; P. citrinum and P. viridicatum, citrinin; P. urticae, patulin and griseofulvin. Sterigmatocystin production by Asp. unguis is reported for the first time.   AS

109

Methods for assay of aflatoxins in coconut products.
Samarajeewa, U.; Arseculeratne, S. N.
Journal of Food Science and Technology, India **12** (1) 27-31 (1975) [7 ref. En] [Dept. of Bacteriol., Univ. of Sri Lanka, Peradeniya, Sri Lanka]

Assay methods for aflatoxins in groundnuts were studied for their applicability to coconut products (copra meal, fresh coconut, and mechanically expressed coconut meal). Extraction methods and solvent systems, viz. (i) 70% aqueous acetone, (ii) chloroform-water, (iii) hexane-aqueous methanol, and (iv) methanol-Soxhlet, gave similar results for aflatoxin content, but a modified (i) procedure was found most suitable because of the relative purity of the extracts and convenience; it was applicable to samples containing ≥0.01 ppm, and time-consuming clean-up procedures were not necessary. A short method with a correction factor is suggested for routine assay.   AL

110

Production of aflatoxin on soybeans.
Gupta, S. K.; Venkitasubramanian, T. A.
Applied Microbiology **29** (6) 834-836 (1975) [17 ref. En] [Dept. of Biochem., Vallabhbhai Patel Chest Inst., Univ. of Delhi, Delhi-7, India]

Probable factors influencing resistance to aflatoxin synthesis in soybeans have been investigated, using cultures of Aspergillus parasiticus NRRL 3240. Soybeans contain a small amount of Zn (0.01 µg/g) bound to phytic acid. Autoclaving soybeans at 15 lb (6803.88 g) pressure for 15 min increases the aflatoxin production, probably by making Zn available. Addition of Zn to both autoclaved and nonautoclaved soybeans promotes aflatoxin production. However, addition of varying levels of phytic acid at a constant Zn concn. depresses aflatoxin synthesis with increasing added phytic acid concn. In a synthetic medium known to give good yields of aflatoxin, the addition of phytic acid (10mM) decreases aflatoxin synthesis.   AS

111

Susceptibility of freshly picked ear corn to invasion by fungi.
Stoloff, L.; Mislivec, P.; Kulik, M. M.
Applied Microbiology **29** (1) 123-124 (1975) [5 ref. En] [Bureau of Foods, FDA, Washington, DC 20204, USA]

An extensive study was made of the possibility of fungal contamination of corn ears between harvesting and laboratory analysis. Using intact mature ears of yellow dent corn (Pioneer 3369A), studies were made of the effects of shucking and oven-drying and of storage (at 23°C) in porous cotton bags and non-porous moisture-proof polyethylene bags. Ears were examined for bright green-yellow (BGY) fluorescence (produced by Aspergillus flavus invasion of corn kernels). All fluorescing kernels were asseyed for aflatoxin. Results indicated that: (i) high-moisture ear corn samples, shucked or unshucked, can be held at 23°C for 9 days without developing visible mould or BGY fluorescence, provided the kernels are intact; (ii) if held in cotton bags, this period can be substantially lengthened; and (iii) non-porous bags should not be used for extended storage, even of dried ears, at room temp.   JA

112

Influence of modified atmosphere storage on aflatoxin production in high moisture corn.
Wilson, D. M.; Jay, E.
Applied Microbiology **29** (2) 224-228 (1975) [12 ref. En] [Univ. of Georgia Coll. of Agric. Expt. Sta., Coastal Plain Sta., Coastal Plain Sta., Tifton, Georgia 31794, USA]

Samples of freshly harvested corn and remoistened corn were inoculated with Aspergillus flavus and stored for 4 wk at about 27°C in air and 3 modified atmospheres. Aflatoxins and fat acidity were determined weekly. Corn stored in the modified atmospheres did not accumulate >15 µg of aflatoxin B_1/kg and 20 µg of total aflatoxins/kg. Corn from the high CO_2 treatment (61.7% CO_2, 8.7% O_2, 29.6% N_2) was visibly moulded at 4 wk and had a higher fat acidity than the other treatments. In the N_2 (99.7% N_2 and 0.3% O_2) and controlled atmosphere (13.5% CO_2, 0.5% O_2, 84.8% N_2) treatments, a fermentation-like odour was detected. When the corn was removed from the modified atmospheres it deteriorated rapidly and was soon contaminated with aflatoxins.   AS

113

Aflatoxin occurrence in some white corn under loan, 1971. I. Incidence and level.
Shotwell, O. L.; Kwolek, W. F.; Goulden, M. L.; Jackson, L. K.; Hesseltine, C. W.
Cereal Chemistry **52** (3, part 1) 373-380 (1975) [13 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

Aflatoxin was detected in 30% of 1283 truckloads of Commodity Credit Corp. white corn (1971) delivered to a designated elevator from 77 loans in

7 counties in southeastern Missouri (detection limit 1-3 ppb (parts/billion)). Only 14% of the truckloads of corn contained >20 ppb aflatoxin. The toxin was not detected in any corn delivered from 20 of the farmers' loans. The geometric means of aflatoxin levels in corn from 7 loans were >20 ppb. Very few truckloads of corn contained aflatoxin G-1. Based on geometric means of aflatoxin level of loans, toxin content was related to grade although with a low correlation coeff. of 0.29 for aflatoxin B-1 and 0.27 for B-2. AS

114

Aflatoxin occurrence in some white corn under loan, 1971. II. Effectiveness of rapid tests in segregating contaminated corn.
Shotwell, O. L.; Shannon, G. M.; Hesseltine, C. W.
Cereal Chemistry **52** (3, part 1) 381-387 (1975) [10 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

Rapid screening tests for detection of aflatoxin were made on truckloads of white corn (1971 crop) under Commodity Credit Corp. as they arrived at an elevator in Missouri. Samples to be tested for presence or absence of aflatoxin were selected on the basis of an inspection with UV light (365 nm) for bright greenish-yellow fluorescence associated with the presence of toxin. Results of the rapid field method were compared with those from quantitative determination and found to be effective, for the most part, in identifying aflatoxin-containing corn. AS

115

Aflatoxin incidence and association with bright greenish-yellow fluorescence and insect damage in a limited survey of freshly harvested high-moisture corn.
Lillehoj, E. B.; Kwolek, W. F.; Fennell, D. I.; Milburn, M. S.
Cereal Chemistry **52** (3, part 1) 403-412 (1975) [21 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

Freshly harvested corn (40-45% moisture) from the 1972 crop was examined for Aspergillus flavus-induced bright greenish-yellow (BGY) fluorescence and for aflatoxin. Sample ears were screened for insects that could provide access for fungal infection. After ears had been dried and shelled the corn was cracked, examined under UV light, and extracted for aflatoxin assay. Samples from 5% of test ears exhibited BGY fluorescence while those from 2.5% of test ears contained aflatoxin B-1 in excess of 20 parts/billion. Essentially all toxin-containing samples were BGY-positive. Aflatoxin was detected in significantly more earworm-damaged samples than in those with no insect damage. Dramatic differences in BGY fluorescence incidence, aflatoxin occurrence, and insect damage were observed between test areas. No aflatoxin-positive samples were found in the 7 fields of southern Illinois corn and in about two-thirds of 62 fields of southeastern Missouri corn. There was no association between recorded agronomic practices followed in the test fields and subsequent aflatoxin contamination. AS

116

Action of weak bases upon aflatoxin B_1 in contact with macromolecular reactants.
Beckwith, A. C.; Vesonder, R. F.; Ciegler, A.
Journal of Agricultural and Food Chemistry **23** (3) 582-587 (1975) [19 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

Radiolabelled aflatoxin B_1 added to corn grain flour, when treated with NH_3 at 25-50°C for periods of 3-30 days, binds covalently and preferentially to corn protein fractions and water-soluble components. In the presence of base, results indicate that 2 types of association can occur between the aflatoxin and macromolecular substrate. A reversible type of association results from opening the lactone ring of the B_1 molecule in basic media and can lead to electrostatic and/or H bonding interactions with substrate. The irreversible or covalent interaction between B_1 and substrate does not visibly alter the spectral properties of the primary B_1 chromophore (365 nm absorbance). The affixation of this chromophore to much larger molecules in the presence of weak bases implicates the dihydrofurofuran ring system of B_1 as the site of B_1 interaction. A marked reduction or complete loss of toxicity in certain corn fractions containing the primary B_1 chromophore is further evidence indicating the difuran ring system to be the site of interaction. AS

117

Detoxification of groundnut oil.
Shantha, T.; Murthy, V. S.
Journal of Food Science and Technology, India (1) 20-22 (1975) [3 ref. En] [Central Food Tech. Res. Inst., Mysore-570013, India]

Several extractants were studied for their efficiency in removing aflatoxin from crude groundnut oil, e.g. 10% NaCl solution, 30% acetone in water, 0.08% NaOH, and 28% liquid NH_3. The 10% NaCl solution proved best suited for the prupose; it was cheap, simple to use, removed about 60-90% of the toxin, caused fewest emulsion problems and gave max. oil recovery (>90%). AL

118

A convenient thin layer chromatographic cleanup procedure for screening several mycotoxins in oils.
Hagan, S. N.; Tietjen, W. H.
Journal of the Association of Official Analytical Chemists **58** (3) 620-621 (1975) [10 ref. En] [Rutgers Univ., Cook Coll., PO Box 231, New Brunswick, New Jersey 08903, USA]

A TLC cleanup development with benzene-hexane (LM+ 1) effectively removed lipids and some contaminants from mixtures of mycotoxins in corn oil, olive oil, peanut oil, soybean oil, and seed extracts. A second development in the same direction as the first, using toluene-ethyl acetate-formic acid (6 + 3 + 1) or benzene-acetic acid (9 + 1), separated the mycotoxins. Satisfactory separation was achieved for commercial oils spiked with sterigmatocystin, zearalenone, ochratoxins A, B, and C, and aflatoxins B_1, B_2, G_1, and G_2. This technique permits detection of 5 parts/billion aflatoxin B_1 in corn. AS

119

Use of zinc acetate in extract purification for aflatoxin assay of cottonseed products.

McKinney, J. D.

Journal of the American Oil Chemists' Society **52** (6) 213 (1975) [4 ref. En] [Ranchers Cotton Oil, Fresno, California 93745, USA]

The Official Association of Official Analytical Chemists' and American Oil Chemists' Society's methods for aflatoxin assay of cottonseed products utilize 20% lead acetate solution to remove gossypol fatty acids, and traces of lipids as insoluble lead derivatives. The substitution of a 20% zinc acetate solution containing a trace of a trivalent metal chloride to precipitate zinc derivatives yields, in some cases, superior cleanup of interfering compounds of primary extracts. AS

120

Sampling cottonseed lots for aflatoxin contamination.

Velasco, J.; Whitaker, T. B.; Whitten, M. E.

Journal of the American Oil Chemists' Society **52** (6) 191-195 (1975) [12 ref. En] [Agric. Marketing Res. Inst., Agric. Res. Service, USDA, Beltsville, Maryland 20705, USA]

Large samples called "sublots" were drawn from 41 commercial lots of contaminated cottonseed. Each sublot was subdivided into twenty 5 lb samples which were analysed for aflatoxin. The mean, median, variance, coeff. of variation, and the estimated range among the sample concn. were computed. The results indicated that: the variance among sample concn. was large and was found to be a function of sample concn. and the distribution of sample concn. was skewed; the density of sample values was greater below the sublot concn. AS

121

[Mammary elimination of aflatoxin from the cow.]

Lafont, P.; Lafont, J.

Cahiers de Nutrition et de Dietetique **10** (1) 55-57 (1975) [10 ref. Fr] [INSERM, Unite de Recherche de Toxicologie Alimentaire, 44 rue du Chemin de Ronde, 78110 Le Vesinnet, France]

Groups of 4 lactating cows received for 5 days a diet containing arachis oil-cake contaminated with aflatoxin B_1. Total intake of aflatoxin B_1/day was 2 mg for group (i), 10 mg for group (ii) and 17.25 mg for group (iii). Milk was analysed on the 3rd and 5th days of treatment, and on the 5th and 9th days after removal of aflatoxin from the diet. Aflatoxin M_1 contents of the milks from the 3 groups on the 3rd day were: (i) 1.55-1.85, (ii) 7.7-8.35 and (iii) 9.75-10.2 µg/l. Similar levels were recorded on the 5th day. After 5 days on an aflatoxin-free diet, the milks contained: (i) trace-0.25, (ii) 0.62, (iii) 0.85-0.90 µg/l. Four days later, no aflatoxin M_1 was detected in (i), only a trace in (ii) and a trace-0.20 µg/l. in (iii). Results indicate that consumption of aflatoxin-contaminated fodder may may lead to the production of contaminated milk over a period of several wk. MEG

122

[Determination of aflatoxins B_1, B_2, G_1 and G_2 in foods.] Analysenverfahren zur Bestimmung der Aflatoxine B_1, B_2, G_1 und G_2 in Lebensmitteln.

Anon.

Bundesgesundheitsblatt **18** (13) 230-233 (1975) [3 ref. De]

A method for determination and identification of aflatoxins in foods is described. Aflatoxins are extracted from comminuted food samples with chloroform; the extract is then filtered, and evaporated to dryness. The residue is re-dissolved in chloroform, and purified by column chromatography; the eluate is then evaporated to dryness, the residue is dissolved in a benzene/acetonitrile (98:2) mixture, and separated by 2-dimensional TLC using diethyl ether/methanol/water (94:4.5:1.5) or chloroform/acetone) (90:10). Aflatoxin spots are detected by UV fluorescence, and quantitatively determined by spectrophotometry. The aflatoxins may be identified on the basis of their Rf values, or by formation of the trifluoroacetic acid derivatives followed by spraying with dilute sulphuric acid. Preparation of standard aflatoxin solutions is also described. AJDW

123

Aflatoxin contamination of corn in the field.

Anderson, H. W.; Nehring, E. W.; Wichser, W. R.

Journal of Agricultural and Food Chemistry **23** (4) 775-782 (1975) [14 ref. En] [Quaker Oats Co., John Stuart Lab., Barrington, Illinois 60010, USA]

Aflatoxin has been found in corn samples at all stages of development and maturity from the late milk stage until harvest. Insect damage was observed in 90% of the samples that showed bright greenish-yellow (BGY) fluorescence normally associated with the presence of aflatoxin in cottonseed and corn. A programme of spraying insecticide, as recommended to sweet corn growers, reduced the incidence of worm damage an average of 97.7% and other insect damage an average of 92.1%. Stressed growing conditions, such as dense population of plants or reduced fertilization, appear to have a positive influence on the incidence of contamination by aflatoxin. The highest incidence of aflatoxin was found in warmer, more humid growing regions. AS

124

A rapid procedure for the detection of aflatoxins in field-collected cottonseeds by thin-layer chromatography.

Merola, G. V.; Ferretti, R. J.; Marsh, P. B.; Simpson, M. E.

Agricultural Research Service, USDA ARS-NE-38, 10pp. (1974) [16 ref. En] [Nutr. Microbiol. Lab., Nutr. Inst., USDA, Beltsville, Maryland 20705, USA]

A unique miniplate procedure is described for the detection of aflatoxins in cottonseeds. It is intended for use in field studies on the control of aflatoxin contamination in cottonseeds before harvest. The original extract of the seeds is chromatographed directly without undergoing any sample is shaken with three times its wt. of chloroform: acetonitrile (1:2) and one-half its wt. of 10% aqueous ferric chloride, after which the extract is chromatographed on a 2-by 3-inch TLC plate with a 3/4-inch band of aluminium oxide at the bottom and a 2 1/4-inch band of silica gel on the remainder of the plate. The developing solvent is diethyl ether-methanol:water (96:3:1). AS

125

[Microbial toxins in cheese.]
Tybeck, E.
Karjantuote **57** (5) 6-8 (1974) [19 ref. Fi]
[Valion Lab., Helsinki, Finland]

This review deals mainly with enterotoxins of staphylococci, causing food poisoning, and aflatoxins formed by moulds (particularly Aspergillus flavus). [From En summ., published separately.] ADL

126

[The occurrence of aflatoxin M in dried milk products.] Über das Vorkommen von Aflatoxin M in Trockenmilcherzeugnissen.
Jung, M.; Hanssen, E.
Food and Cosmetics Toxicology **12** (1) 131-138 (1974) [27 ref. De, en] [H. Bahlsens Keksfabrik KG, Hannover, Federal Republic of Germany]

Aflatoxin M_1 content of dried milk products was determined by the AOAC fluorimetric method. Of 58 dried whole milks examined between Jan. 1972 and May 1973, about one-half contained the toxin in amounts up to 0.002 ppm. Of 62 dried skim-milk samples about two-thirds contained up to 0.002 ppm aflatoxin M_1; two dried skim-milk samples contained 0.003 and 0.004 ppm aflatoxin M_1. Aflatoxin M_1 content was lowest in summer and early autumn following replacement of winter feed by pasture. Of dried wheys and infant foods examined, about one-half contained aflatoxin M_1, but in amounts, about 0.001 ppm, which are below those encountered in dried milks. GTP

COPYRIGHT REGULATIONS

Form of Declaration and Undertaking

To the Editor, International Food Information Service, Shinfield,
Reading RG2 9AT, Berkshire, England.

1. I ....

   of ....

   Hereby request you to make and supply to me a

   Photocopy of the article covered by

   Journal name ....

   Volume ...... Part ...... Pages .... Year ....

   which I require for the purposes of research or private study.

2. I have not previously been supplied with a copy of the said article/part of the said work by any librarian.

3. I undertake that if a copy is supplied to me in compliance with the request made above, I will not use it except for the purposes of research or private study.

   Signature* .... Date ....

   (*Note: This must be the personal signature of the person making the request. A stamped or typewritten signature or the signature of an agent is NOT sufficient.)

4. Send this form and remittance (10p per page) to the above address. (Minimum charge 50p)

(Note: Additional forms are available on request)

FOOD ANNOTATED BIBLIOGRAPHIES (FABs).

FAB		Vol. 1 - 7 incl. Price	Vol.8 1976 Price	Vol.9 1977 updated monthly Price
1	Application of Reverse Osmosis to Food Processing	☐ £8.00	☐ £3.00	☐ £6.00
2	New Sources of Food Protein	☐ £15.00	☐ £6.00	☐ £13.00
3	Natural and Synthetic Sweeteners	☐ £9.00	☐ £3.00	☐ £7.00
4	Techniques for Analysis of Flavour Volatiles	☐ £13.00	☐ £3.00	☐ £8.00
5	Microwaves in Food Processing	☐ £8.00	☐ £3.00	☐ £6.00
6	Texture Analysis of Foods	☐ £18.00	☐ £4.00	☐ £9.00
7	Synthetic Dairy Products	☐ £8.00	☐ £3.00	☐ £6.00
8	Acidulants in Foods	☐ £11.00	☐ £3.00	☐ £6.00
9	Agglomeration of Powders	☐ £8.00	☐ £3.00	☐ £6.00
10	Aseptic Packaging	☐ £8.00	☐ £3.00	☐ £7.00
11	EEC Regulations	☐ £8.00	☐ £3.00	☐ £6.00
12	Toxicology of Food Additives	☐ £8.00	☐ £3.00	☐ £7.00
13	Deep Fat Frying	☐ £11.00	☐ £3.00	☐ £8.00
14	Viscosity of Foods	☐ £11.00	☐ £3.00	☐ £7.00
15	Taste Panels in Food Science	☐ £8.00	☐ £3.00	☐ £8.00
16	Taints in Foods	☐ £8.00	☐ £3.00	☐ £7.00
17	Microbial Toxins in Foods	☐ £8.00	☐ £3.00	☐ £8.00
18	Smoked Food Products	☐ £9.00	☐ £3.00	☐ £6.00
19	Disposal of Waste Food Products	☐ £12.00	☐ £5.00	☐ £9.00
20	Use of Glucose in Food Products	☐ £8.00	☐ £3.00	☐ £6.00
21	Emulsifiers in Foods	☐ £9.00	☐ £3.00	☐ £7.00
22	Stabilizers in Foods	☐ £9.00	☐ £3.00	☐ £7.00
23	Staling and Antistaling Additives	☐ £8.00	☐ £3.00	☐ £6.00
24	Catering Industry	☐ £8.00	☐ £3.00	☐ £6.00
25	Antioxidants	☐ £9.00	☐ £3.00	☐ £7.00
26	Nitrosamines	☐ £8.00	☐ £3.00	☐ £6.00
27	Content and Analysis of Mercury in Foods	☐ £6.00	☐ £3.00	☐ £7.00
28	Content and Analysis of Lead in Foods	☐ £7.00	☐ £3.00	☐ £6.00
29	Heatable Packs	☐ £6.00	☐ £3.00	☐ £6.00
30	Sulphur Dioxide in Food Products	☐ £8.00	☐ £3.00	☐ £6.00
31	Lactic Acid Bacteria in Beverages and Food	☐ £11.00	☐ £3.00	☐ £8.00
32	Colorants	☐ £9.00	☐ £3.00	☐ £6.00
33	Browning of Foods	☐ £8.00	☐ £3.00	☐ £6.00
34	Aflatoxins	☐ £7.00	☐ £3.00	☐ £7.00
35	Antibiotic Properties and Residues in Food excluding Nisin	☐ £8.00	☐ £3.00	☐ £6.00
36	Nisin	☐ £6.00	☐ £3.00	☐ £6.00
37	Cadmium in Foods	☐ £6.00	☐ £3.00	☐ £6.00
38	Coffee	☐ £10.00	☐ £3.00	☐ £7.00
39	Sorbic Acid	☐ £7.00	☐ £3.00	☐ £6.00
40	Arsenic in Foods	☐ £6.00	☐ £3.00	☐ £6.00
41	Ascorbic Acid	☐ £5.00	☐ £3.00	☐ £8.00
42	Thickeners and Gelling Agents	☐ £4.00	☐ £3.00	☐ £6.00
43	Pseudomonadaceae and Food Processing	☐ £5.00	☐ £3.00	☐ £6.00
44	Spores in Food	☐ £3.00	☐ £3.00	☐ £7.00
45	Breadmaking	☐ £9.00	☐ £3.00	☐ £6.00
46	Bread Properties	☐ £8.00	☐ £3.00	☐ £6.00
47	Food Science and Technology Books	☐ £11.00	☐ £6.00	☐ £12.00
48	Nitrates and Nitrites in Meat Products	☐ *£4.00	☐ £3.00	☐ £7.00
49	Eggs & Poultry Meat	☐ *£8.00	☐ £6.00	☐ £10.00
50	Mycotoxins in Foods (Excluding Aflatoxins & Microbial Toxins)	☐ £4.00	☐ £3.00	☐ £6.00
51	Meat Canning	☐ *£4.00	☐ £3.00	☐ £7.00

Prices include postage by surface mail. For airmail rates, please apply to the address below. * Vol. 6 - 7 only available

To order, or obtain further information, mark the item required, add your name and address and send cash, cheque or postal order to: –

International Food Information Service (IFIS)
Lane End House,
Shinfield, Reading, RG2 9BB,
England.

NAME ....

ADDRESS ....

....

INTERNATIONAL FOOD INFORMATION SERVICE

ifis

FAB 34

AFLATOXINS

SELECTED FROM VOLUME 8
FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

under the direction of

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks; Institut fur Dokumentationswesen, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen; Zentralstelle fur maschinelle Dokumentation–Frankfurt am Main.

INTRODUCTION

Food Annotated Bibliographies (FABs) are collections of abstracts on specific topics in food science and technology. The topics are chosen by the staff of the International Food Information Service as being of particular interest or importance. The topics normally interest individual workers, who may not require the full information provided in Food Science and Technology Abstracts, from which the abstracts for FABs are taken. The size and the cost of the FABs are controlled as much as possible with the interests of individual workers in mind.

Titles of the FABs now available are given on the back cover of this booklet. New titles are being added at the rate of about 10 per year. For up-to-date lists of FABs or suggestions for new topics please write to the address given overleaf. New subjects are searched for at least the five most recent volumes of Food Science and Technology Abstracts. Thereafter each FAB is updated monthly. Copies of each months abstracts on any topic may be obtained as indicated on the back cover of this publication. At the end of each volume of up-dating, the abstracts are merged and made available as a separate supplement to the original FAB.

Some of the larger FABs have been divided into sections to facilitate use. Abstracts are not printed in more than one section. The larger FABs also have subject indexes provided.

Copies of all original articles referred to in the abstracts may be bought (or occasionally borrowed) from the International Food Information Service. A form for ordering these is provided at the end of this FAB.

Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journals patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

ASSISTANT EDITOR

1

[Biological testing using the brine shrimp. I. Sensitivity of the brine shrimp to mycotoxins.]
Tanaka, K.; Minamisawa, M.; Manabe, M.; Matuura, S.
Report of the National Food Research Institute [Shokuryo Kenkyusho Kenkyu Hokoku] No. 30, 43-48 (1975) [11 ref. Ja, en]

Studies on the sensitivity of the brine shrimp (Artemia salina) to various mycotoxins (T-2 toxin, sterigmatocystin, diacetoxyscirpenol, aflatoxins, fusarenon-x, rubratoxin-B, kojic acid, ochratoxin A, aspergillic acid, patulin, penicillic acids, citrinin, ruglosin) are described. The results are discussed with reference to the potential use of this organism for biological screening for mycotoxins. [From En summ.] AJDW

2

Toxigenic fungi in food.
Davis, N. D.; Wagener, R. E.; Dalby, D. K.; Morgan-Jones, G.; Diener, U. L.
Applied Microbiology **30** (1) 159-161 (1975) [12 ref. En] [Dept. of Bot. and Microbiol., Auburn Univ., Agric. Expt. Sta., Auburn, Alabama 36830, USA]

45 fungal isolates from mouldy supermarket foods were tested for toxicity to brine shrimp, and 22 of these isolates were subsequently tested for toxicity to chicken embryos. Highly toxigenic fungi were Cladosporium sphaerospermum from a bakery product, Fusarium oxysporum from carrots, F. solani from cabbage, Aspergillus niger and Penicillium corylophilum from bread, P. cyclopium and P. herquei from corn meal, P. lanosum from onions, P. steckii from chocolate syrup, Penicillium sp. from jelly, and Rhizopus nigricans isolates from sweet potato, applesauce, and strawberries. Approximately one-third of the fungal cultures were moderately to highly toxigenic to brine shrimp and chicken embryos, while several additional cultures were slightly toxigenic. AS

3

Fluorometric measurement of aflatoxin adsorbed on Florisil in minicolumns.
Velasco, J.
Journal of the Association of Official Analytical Chemists **58** (4) 757-763 (1975) [9 ref. En] [Agric. Marketing Res. Inst., USDA, Beltsville, Maryland 20705, USA]

Filter fluorometers have been adapted to measure the fluorescence intensity of aflatoxin adsorbed on a Florisil layer in minicolumns. The relationship between concn. and intensity is near linear in the aflatoxin range from 10 to 100 ng. Although individual aflatoxin fractions cannot be resolved, since the measure is one of total intensity, fluorometric measurement advance the minicolumn screening procedure to a semiquantitative level. The detection of 1 ng aflatoxin B_1 is well within the limits of a filter fluorometer with a photomultiplier detector. A precision, expressed as % coeff. of variation, ranging from 1.2 to 4.2%, was obtained for standard B_1 columns. AS

4

Occurrence of natural toxins in food. [Review]
Crampton, R. F.; Charlesworth, F. A.
British Medical Bulletin **31** (3) 209-213 (1975) [52 ref. En] [British Ind. Biol. Res. Assoc., Carshalton, Surrey, UK]

Toxic materials present as natural constituents in foods are discussed, with special reference to: carcinogens in food (including mycotoxins, nitrosamines, Se, polycyclic aromatic hydrocarbons, safrole, cycasin (present in cycad nuts) and pyrrolizidine alkaloids); relationship between aflatoxin intake and primary liver cancer; dose response to dietary carcinogens; and oxalates as food toxins (with reference to epidemiological evidence, oxalate concn. in various foods and beverages, genetic factors and metabolic factors). AJDW

5

Effects of trace metals on the production of aflatoxins by Aspergillus parasiticus.
Marsh, P. B.; Simpson, M. E.; Trucksess, M. W.
Applied Microbiology **30** (1) 52-57 (1975) [11 ref. En] [Nutr. Inst., Agric. Res. Service, Beltsville, Maryland 20705, USA]

6

Mycotoxins.
Austwick, P. K. C.
British Medical Bulletin **31** (3) 222-229 (1975) [91 ref. En] [Nuffield Inst. of Comparative Med., Zoological Society of London, London, UK]

Problems of mycotoxins occurring in foods are discussed, with reference to: the chemical nature of mycotoxins; factors influencing formation of mycotoxins in foods; toxic effects of mycotoxins (carcinogenicity, teratogenicity, and effects on liver, kidneys, alimentary tract, skin, nervous system, muscle tissue, respiratory trate and reproductive tract); toxic phytoalexins; and detection and control measures. Tables are given of names, causative organisms, toxic effects and incidence of numerous mycotoxins. AJDW

7

Dietary factors and aflatoxin toxicity. I. Comparison of the effect of two diets supplemented with aflatoxin B_1 upon two different strains of rats.
Alfin-Slater, R. B.; Aftergood, L.; Wells, P.; Melnick, D.; Straus, R.
Journal of the American Oil Chemists' Society **52** (8) 266-271 (1975) [18 ref. En] [School of Public Health, Univ. of California, Los Angeles, California 90024, USA]

8

Dietary factors and aflatoxin toxicity. II. Effect of fat source upon aflatoxicosis in rats.
Wells, P.; Aftergood, L.; Alfin-Slater, R. B.; Melnick, D.; Straus, R.
Journal of the American Oil Chemists' Society **52** (8) 272-277 (1975) [17 ref. En] [School of Public Health, Univ. of California, Los Angeles, California 90024, USA]

See preceding abstr.

9

Collaborative study of a rapid method for determination aflatoxins in cottonseed products.
Pons, W. A., Jr.
Journal of the Association of Official Analytical Chemists **58** (4) 746-753 (1975) [8 ref. En] [S. Regional Res. Center, Agric. Res. Service, USDA, New Orleans, Louisiana 70179, USA]

11 laboratories collaboratively studied a modification of the official final action AOAC method, 26.048-26.056, for determining aflatoxins in cottonseed products. An aflatoxin-negative meal, 6 contaminated meals, 4 contaminated meats (kernels) samples, and 2 NH_3-inactivated meals were used. Mean aflatoxin values, μg/kg, ranged from 6 to 223 (B_1), 2 to 44 (B_2), and 7 to 266 (total: $B_1 + B_2$). Only 1 laboratory reported a false-positive for the negative meal. The mean coeff. of variation for B_1, B_2, and total were 28, 56, and 29%, respectively, for meals; 35, 54, and 37%, respectively, for meats; and 35, 58, and 38%, respectively, for ammoniated meals. Statistical treatment of data from triplicate sets of meals and meats showed evidence for systematic error between laboratories. Since the modified method is considerably faster than the official method and yields precision estimates consistent with previous AOAC collaborative studies on determining aflatoxins, the method has been adopted as official first action. AS

10

[Determination of aflatoxin B_1 in fruit-based foods.]
Lafont, P.; Lafont, J.
Cahiers de Nutrition et de Dietetique **10** (1) 57-58 (1975) [3 ref. Fr] [INSERM, Unite de Recherche de Toxicologie Alimentaire, 44 rue du Chemin de Ronde, 78110 Le Vesinet, France]

Acetone extracts of a baby food preparation based on apricots contained a blue fluorescent substance with an Rf similar to that of aflatoxin B_1. Treatment of the eluted substance with conc. HCl for 10 min at 100°C did not lead to formation of aflatoxin B_{2a}. It could also be differentiated from aflatoxins by the decrease in fluorescence after the chromatogram had been exposed to diffuse light for 1 or 2 days. Smaller amounts of this interfering substance were found in plums, peaches, nectarines and bilberries, but none was found in apples, quinces, cherries, bananas or cocounts. When using TLC analysis to detect aflatoxins in fruit it is recommended that the chromatogram should be developed first with ether/H_2SO_4 and then with chloroform:methanol (90:10, v/v) to remove this interfering substance. MEG

11

Emodin, a toxic metabolite of Aspergillus wentii isolated from weevil-damaged chestnuts.
Wells, J. M.; Cole, R. J.; Kirksey, J. W.
Applied Microbiology **30** (1) 26-28 (1975) [17 ref. En] [Southeastern Fruit & Tree Nut Res. Sta., USDA, Byron, Georgia 31008, USA]

A diarrheagenic toxin from culture extracts of Aspergillus wentii Wehmer isolated from weevil-damaged Chinese chestnuts was identified as emodin (2-methyl-4,5,7-trihydroxyanthraquinone). The orange-red crystalline toxin (mp 255-257°C) showed UV absorption maxima in ethyl alcohol at 223, 250, 267, 290 and 442 nm, and IR absorption maxima at 3400 cm^{-1} (OH), 1635, and 1625 cm^{-1}. Chemical shifts and coupling constants of the proton magnetic resonance spectra of the A. wentii toxin and of authentic emodin agreed. Mean lethal dose of emodin orally administered to 1-day-old DeKalb cockerels was 3.7 mg/kg. AS

12

Effect of storage upon aflatoxin levels in peanut materials.
Baur, F. J.
Journal of the American Oil Chemists' Society **52** (8) 263-265 (1975) [3 ref. En] [Procter & Gamble Co., Winton Hill Tech. Center, Cincinnati, Ohio 45224, USA]

Four naturally contaiminated peanut materials (commercial peanut butter, pilot plant prepared raw peanut butter, commercial peanut meal and laboratory deoiled commercial peanut butter) were studied in 6 laboratorries to determine aflatoxin stability during storage. Materials were selected with atypically high levels of aflatoxin contamination, (9.0-149.6 μg/kg) μg) to accentuate possible losses. Samples were withdrawn from storage at intervals (0, 6, 12 and 24 months) and analysed by TLC. Statistical analysis of the data is given in a table. Aflatoxins were found to be stable at either 0°F or 73°F storage in peanut materials for ≤2 yr. It was also found that mixed aflatoxin standards, prepared from pure crystalline individual aflatoxins, dissolved in benzene/acetonitrite may be kept at 0°F without deterioration, and that densitometric and visual measurements of TLC plates were essentially identical. JRR

13

A quantitative method for determination of aflatoxin B_1 in roasted corn.
Shannon, G. M.; Shotwell, O. L.
Journal of the Association of Official Analytical Chemists **58** (4) 743-745 (1975) [16 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

Roasting aflatoxin-contaminated corn will reduce toxin levels. A quantitative analysis for aflatoxin in roasted corn has been developed by modifying a cleanup technique for green coffee extracts approved as official first action by the AOAC. A chloroform extract is partially purified on a Florisil column, and TLC plates are developed with methylene chloride-chloroform-isoamyl alcohol-formic acid (81 + 15 + 3 + 1). Recoveries average 101% and the sensitivity limit is 5 parts/billion aflatoxin B_1. A 2-dimensional TLC procedure can also be used to separate the aflatoxins from background interferences. AS

14

[Accumulation of aflatoxins on wheat grain inoculated with Aspergillus flavus NRRL 2999 and their distribution in milling products.]
L'vova, L. S.; Sosedov, N. I.; Shatilova, T. I.; Shul'gina, A. P.
Prikladnaya Biokhimiya i Mikrobiologiya **11** (4) 559-564 (1975) [9 ref. Ru, en]

The influence of temp. (15-35°C) and RH (75-90%) on the accumulation of aflatoxins on wheat grain inoculated with Asp. flavus NRRL 2999 was investigated. The lowest accumulation of aflatoxins took place at 20°C and 80% RH, the highest at 30°C and 90% RH. Under these conditions aflatoxins appeared in the grain after 3 days storage. Analysis of 3 grades of 78% extraction flour showed a decrease in the aflatoxin content of first and second grade flour. During baking of leavened bread 70-80% of the aflatoxins were decomposed. The potential use of rapid conditioning and the Remix-method to reduce the content of aflatoxins in flour and bread is discussed. AS

15

[Mycotoxins in foods. IV. The influence of various packaging materials on growth of Aspergillus flavus and production of aflatoxin B_1 and G_1 on some types of sliced bread.] Mycotoxine in Nahrungsmitteln. IV. Der Einfluss verschiedener Verpackungsfolien auf das Wachstum von Aspergillus flavus und die Bildung der Aflatoxine B_1 und G_1 auf einigen Schnittbrotarten.
Reiss, J.
Food and Cosmetics Toxicology **13** (3) 325-329 (1975) [19 ref. De, en] [Mikrobiol. Lab., Grahamhaus Studt KG, 655 Bad Kreuznach, Federal Republic of Germany]

The growth of Aspergillus flavus and the production of aflatoxins on sliced bread largely depends upon the O_2 permeability of the packaging film; the lower this factor, the poorer the mould growth and the less aflatoxins produced. Investigations were carried out into the concn. of aflatoxins B_1 and G_1 in sliced bread (wheat germ bread, linseed bread, Graham bread, sliced farmhouse bread) after 10 and 20 days storage in cellophane GEB 300, Trespaphan PC, polypropylene, polyvinyl chloride, and polyvinylidene chloride coated polypropylene film. It was found that O_2 deficiency had a more marked inhibitory effect on the formation of aflatoxin B_1 than on that of G_1. The degree of acidity and the composition of the different types of bread also affecting fungal growth and aflatoxin production. [See FSTA (1974) **6** 3M464 for part III.] VJG

16

[Aflatoxins and their presence in milk and milk powder.]
Veringa, H. A.; Standhouders, J.; Harten, M. van
Zuivelzicht **67** (35) 774-776 (1975) [Nl, en] [Nederlands Inst. voor Zuivelonderzoek, (NIZO), Ede, Netherlands]

After a general discussion on aflatoxins, theor chemical composition and toxicity, results are summarized of an investigation into the aflatoxin content of dried milk produced in 7 factories in various parts of the Netherlands in 1974. Most samples contained 0.1-1.0 μg/kg, but some had a much higher content. Dried milk produced in the grazing season contained much less aflatoxin M_1 (0.3 vs. 0.9 μg/kg) than that produced in the indoor feeding period; this is attributed to greater feeding of concentrates in winter. There were regional differences in aflatoxin content of dried milk, possibly due to corresponding differences in the aflatoxin B_1 content of concentrates. It is pointed out that aflatoxin M_1 in dairy products cannot be destroyed either by heating or microbiological souring but treatment with NH_3 appears to offer reasonable prospects of destroying aflatoxin B_1 in feedstuffs. Various approaches to the problem of aflatoxins in dairy products are discussed (prohibiting or restricting use of groundnuts in concentrates for dairy cattle, etc.). ADL

17

Determination of aflatoxin M_1 in the milk at the parts per trillion level.
Tuinstra, L. G. M. T.; Bronsgeest, J. M.
Journal of Chromatography **111** (2) 448-451 (1975) [11 ref. En] [Gov. Dairy Sta., Vreewijkstraat 12 B, Leiden, Netherlands]

A milk sample is extracted with cadmium sulphate solution and chloroform, the chloroform layer is evaporated to dryness, and the residue is dissolved in dry diethyl ether and transferred onto a silica gel column previously deactivated with 3% of water; aflatoxin M_1 is eluted with chloroform

containing 3% of methanol, the eluate is evaporated and the residue dissolved in chloroform. As screening procedure, TLC is performed using diethyl ether/methanol/water (94.5:4.5:1.5) and then at right angles using chloroform/acetone/isopropanol (85:10:5). The plate is examined under UV light; detection limit is 0.01 µg/kg. For quantitative determination Fertigplatte Kieselgel (Merck) plates are used and standard amounts of aflatoxin M_1 are applied; detection limit can be reduced to 4 ng/kg milk. Aflatoxin M_1 in an extract corresponding to 30 ml milk was estimated to be approx. 0.02 µg/kg milk. DMK

18

[Occurrence, growth and toxin formation of moulds in foods.] [Review]
Northolt, M. D.; Schothorst, M. van; Soentoro, P. S. S.
Voedingsmiddelentechnologie 8 (13) 14, 15, 18, 19 (1975) [32 ref. Nl] [Rijks Inst. voor de Volksgezondheid, Postbus 1, Bilthoven, Netherlands]

Aspects considered in this review on growth and toxin formation by moulds in foods include: toxigenic mould spp., and the toxins produced; the relation between mycelial growth and toxin formation; effects of temp. and water activity on growth and toxin formation; effect of O_2 concn.; effects of the substrate; and effects of interaction with other microorganisms. AJDW

19

[Mass spectroscopy of aflatoxins.] Zur Massenspektroskopie der Aflatoxine.
Bencze, K.; Kiermeier, F.; Miller, M.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 159 (1) 7-14 (1975) [13 ref. De, en] [Inst. für Milchwissenschaft und Lebensmittelverfahrenstech., Tech. Univ., Munich, Federal Republic of Germany]

20

[Natural mycotoxin contaminants in agricultural products.] [Review]
Jemmali, M.
Bulletin des Anciens Eleves de l'Ecole Francaise de Meunerie No. 267, 131-140 (1975) [37 ref. Fr] [Sta. de Biochimie et Physicochimie des Cereales, Service des Mycotoxines, 16 Rue Nicolas-Fortin, 75013 Paris, France]

In this review the problems associated with contamination of foods by moulds are discussed under the headings: origins and type of fungal contamination; physical, chemical and biological factors influencing fungal growth; biochemical process occurring in products as a result of fungal growth; and production of mycotoxins and their pathological effects in man and animals. MEG

21

Bright greenish-yellow fluorescence and aflatoxin in agricultural commodities.
Bothast, R. J.; Hesseltine, C. W.
Applied Microbiology 30 (2) 337-338 (1975) [7 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

The corn milling industry has widely accepted the presence of bright greenish-yellow fluorescence under a black light as a presumptive indicator of aflatoxin. This test was applied to wheat, oats, barley, rice, coconut, white corn, yellow corn, peanuts, sorghum, and soybeans, and evaluated in the laboratory. The study supported the use of bright greenish-yellow fluorescence as a presumptive test for aflatoxin in wheat, oats, barley, corn, and sorghum. AS

22

The significance of mycotoxins in foods. [Lecture]
Jarvis, B.
IFST Proceedings 8 (2) 88-92 (1975) [9 ref. En] [Leatherhead Food RA, Randalls Road, Leatherhead, Surrey, KT22 7RY, UK]

Occurrence of mycotoxins in foods is reviewed. Numerous spp. of microfungi produce toxic metabolites of diverse chemical constitution; systematic classification is not possible on either a chemical or a toxicological basis. Apart from the aflatoxins, little is known of their possible effects on man; legislative standards introduced by several countries for control of aflatoxins, ochratoxin A, rubratoxin, citrinin, penicillic acid, zearalenone and patulin are discussed with reference to mould spp. involved, food source (mainly cereals and oilseeds), chemical constitution and potential importance to man. The major risk is associated with contamination of primary products (cereals, nuts, oilseeds, dried fruits) and subsequent fungal growth during storage, particularly after wet harvests. There is little evidence of a serious hazard to human health from mould spoilage of manufactured foods or from mould fermented foods (blue cheese, salami); mould enzyme preparations for food use appear to be quite safe. ELC

23

Aspergillus flavus infection and aflatoxin production in fig fruits.
Buchanan, J. R.; Sommer, N. F.; Fortlage, R. J.
Applied Microbiology 30 (2) 238-241 (1975) [8 ref. En] [Dep. of Pomology, Univ. of California, Davis, California 95616, USA]

Immature fig fruits did not support colonization and aflatoxin production by Asp. flavus Lk. but became susceptible when ripe. While sun-drying on the tree, fruits were particularly vulnerable to fungal infection and colonization. Aflatoxin accumulation equalled levels frequently reported for such seeds as peanuts and cereal grains. AS

24

Mycotoxins in hot spots in grains. I. Aflatoxin and zearalenone occurrence in stored corn.
Shotwell, O. L.; Goulden, M. L.; Bothast, R. J.; Hesseltine, C. W.
Cereal Chemistry **52** (5) 687-697 (1975) [11 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

A hot spot that developed Aspergillus flavus growth in a bin of corn in central Illinois during warm weather was investigated for mycotoxins. High levels of aflatoxin (1000-1700 ppb (parts/billion)) were detected in samples collected near the centre of the hot spot that was defined by visible Asp. flavus sporulation. The location of the hot spot relative to an open window indicated the moisture necessary for mould growth, and aflatoxin formation could have come from rains blown through the window. Corn collected at all depths from 7 locations and probe samples taken under the hot spot were assayed for aflatoxin and zearalenone. Aflatoxin was not detected in samples collected furthest from the window. Zearalenone was detected in some of the samples collected, but it was not confined to any one part of the bin. The corn had been in the field an unusually long time before harvest because of cold, wet weather. Individual kernels selected from locations likely to contain aflatoxin and zearalenone were assayed for mycotoxins. Even in kernels connected with Asp. flavus mycelia, aflatoxin-free kernels occurred adjacent to highly contaminated kernels. Of 140 kernels analysed for both aflatoxin and zearalenone, 16 contained aflatoxin (260-38 000 ppb $B_1 + B_2$) and 12 had zearalenone (9000-1 700 000 ppb). In no kernel were both aflatoxin and zearalenone detected.   AS

25

Aflatoxin occurrence in some white corn under, loan, 1971. III. Association with bright greenish-yellow fluorescence in corn.
Shotwell, O. L.; Goulden, M. L.; Jepson, A. M.; Kwolek, W. F.; Heseltine, C. W.
Cereal Chemistry **52** (5) 670-677 (1975) [15 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

Studies were made on the relation between the occurrence in white corn samples from 1283 truckloads of Commodity Credit Corporation corn delivered at an elevator in southeastern Missouri of bright greenish-yellow (BGY) fluorescence under UV light (365 nm) and the presence and levels of aflatoxin. Although numbers of BGY fluorescing particles were related to levels of aflatoxin, the BGY fluorescent test could not be used to determine levels of toxin. Of the 10 lb whole-kernel corn samples having at least one BGY fluorescing corn particle or kernel, 55% contained measurable aflatoxin; 28% contained >20 ppb (parts/billion) toxin, the present FDA guideline. The analytical method was sensitive to 1-3 ppb aflatoxin. Of the corn samples that had >20 fluorescing kernels and particles, 95% were contaminated with aflatoxin. 65% of them had >20 ppb toxin. Cracking corn before UV light (365 nm) inspection revealed more samples with BGY fluorescence, and 19% of these contained >1-3 ppb aflatoxin. [See FSTA (1975) **7** 11M1293 for part II.]   AS

26

[Effect of pimaricin on moulds and their aflatoxin formation in cheese.] Zur Wirkung von Pimaricin auf Schimelpilze und deren Aflatoxinbildung bei Käsen.
Kiermeier, F.; Zierer, E.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **157** (6) 253-262 (1975) [42 ref. De, en] [Milchwissenschaftliches Inst., Tech. Univ. Munich, D-8050 Weihenstephan, Federal Republic of Germany]

Pimaricin, stable to heat below 80°C and possessed of low penetrating power (some 2.6 mm in hard cheeses), has advantages as a long-term surface mould inhibitor. Its effectiveness in controlling the formation of aflatoxins was investigated in experiments on 13 aflatoxin-forming moulds. Inhibition of aflatoxin formation depended on prevention of spore generation and not on any adverse effect on aflatoxin once formed. Effective protection of the cheese, e.g. absence of mould growth for 8 wk, therefore requires early application of pimaricin. Somewhat later application has however a certain inhibiting effect since the toxin is formed chiefly in the later stages of mycelial growth. Aflatoxin formation is markedly favoured by presence of casein and slightly inhibited by lactose.   GTP

27

Bacillus subtilis GSY 1057 assay for aflatoxin B_1 activation by rainbow trout (Salmo gairdneri).
Schoenhard, G. L.; Bishop, P. E.; Lee, D. J.; Sinnhuber, R. O.
Journal of the Association of Official Analytical Chemists **58** (5) 1074-1076 (1975) [9 ref. En] [Dep. of Food Sci. & Tech., Oregon State Univ., Corvallis, Oregon 97331, USA]

A rapid and sensitive microbial assay was developed to detect lethal products of aflatoxin B_1 metabolism by rainbow trout (Salmon gairdneri) Mt. Shasta strain. Bacillus subtilis GSY 1057 (hisA1, uvr-1, metB4), a DNA repair deficient strain, was incubated for 20 min in the 20 000 g supernate from trout liver homogenates which had been preincubated for 10 min with various levels of aflatoxin B_1. Serial dilutions of the incubation mixture were plated in triplicate on tryptose blood agar base plates and colonies were counted after 12 h at 37°C. One µmol aflatoxin B_1 in 3.2 ml incubation mixture reduced viability 60%.   AS

28

The effect of zinc and phytic acid on the incorporation of 1-^{14}C-acetate into aflatoxin by resting mycelia of Aspergillus parasiticus.
Gupta, S. K.; Venkitasubramanian, T. A.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 159 (2) 107-111 (1975) [15 ref. En, de] [Dep. of Biochem., Vallabhbhai Patel Chest Inst., Univ. of Delhi, Delhi 110007, India]

The effect of Zn and phytic acid on [1-^{14}C]-acetate incorporation into aflatoxins by resting mycelium was studied. When different levels of $ZnSO_4$ were used, it was found that the specific radioactivity incorporation into aflatoxins was max. at 10mM $ZnSO_4$. At this concn. the changes in the specific radioactivities of aflatoxins $B_1 + B_2$ and aflatoxins $G_1 + G_2$ were +74.61% and +29.66%, respectively. On the other hand, phytic acid had an inhibitory effect on the incorporation of [1-^{14}C]-acetate. Extending these observations to the query as to why soybean does not promote the production of aflatoxins, it can be concluded that the high content of phytic acid in soybean binds with Zn to make it unavailable, and Zn is an absolute requirement for aflatoxin synthesis. AS

29

Aflatoxin production on some feeds and foods.
Benson, M. W.; Kurtzman, R. H., Jr.; Halbrook, W. U.; McCready, R. M.
Journal of Food Science 40 (5) 1085-1086 (1975) [11 ref. En] [USDA, W. Regional Res. Lab., Berkeley, California 94710, USA]

Samples of foods and feeds were sterilized, hydrated, inoculated with an aflatoxin-producing strain of Aspergillus flavus, and after growth had occurred, an extraction for aflatoxins was made and assayed by a TLC method. Growth of Asp. flavus occurred and aflatoxins were detected in all except castor and alfalfa meal. Most foods are rarely stored under conditions where the growth of Asp. flavus would occur. However, foods moistened, sterilized and inoculated with Asp. flavus supported growth and aflatoxin was produced. Selected livestock feeds, castor and alfalfa meal, supported growth of Asp. flavus but aflatoxin was not produced. IFT

30

Aflatoxin can be degraded by the mycelium of Aspergillus parasiticus.
Shih, C.-N.; Marth, E. H.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 158 (6) 361-362 (1975) [8 ref. En, de] [Dep. of Food Sci., Univ. of Wisconsin, Madison, Wisconsin, USA]

Aflatoxins B_1, B_2, G_1, and G_2 were degraded by 8- and 16-day old but not by 4-day old mycelium of a toxigenic strain of Asp. parasiticus. The 16-day old mycelium degraded the toxin more rapidly than did the 8-day old mycelium. Degradation of toxin by the mycelium was similar at pH 2.5 and 6.0. AS

31

A study of the chemical inactivation of aflatoxins in peanut protein isolates and of some of their physico-chemical properties.
Natarajan, K. R.
Dissertation Abstracts International, B 36 (1) 211-212: Order no. 75-15053 (1975) [En] [Texas A&M Univ., College Station, Texas, USA]

81-89% and 51-56% of aflatoxins originally present in raw peanuts were retained in protein concentrate and isolate, respectively, when prepared by aqueous extraction, 55-65% of aflatoxins present in defatted peanut meal were retained in protein isolate prepared from it. NaOCl was effective in destroying aflatoxins B_1 and B_2 in the protein isolates. NaOCl-treated isolates were darker and slightly less soluble at pH 5.5-7.5 than untreated isolates; high concn. of NaOCl also reduced tryptophan and tyrosine contents. Polyacrylamide gel electrophoresis showed that NaOCl may destroy α-conarachin, a major globular protein in the conarachin fraction, and a major subunit of conarachin with mol. wt. of approx. 62 000 (probably from α-conarachin). Tryptophan content of the conarachin fraction was reduced by NaOCl treatment. AMW

32

[Mycotoxins in foods: aflatoxin in peanuts.]
[Review]
Labarthe, B.
Alimentation et la Vie 63 (1) 12-25 (1975) [26 ref. Fr] [Fac. des Sci., Geneva, Switzerland]

The topics discussed briefly in this review are: methods for detecting and measuring aflatoxins B_1, B_2, G_1 and G_2; levels of aflatoxins found in foods; toxicity for man and animals; effects of harvesting and storage conditions on the aflatoxin content of peanuts; and methods for preventing or destroying aflatoxin contamination. MEG

33

Aflatoxin quality control seminar. December 4, 1974. [Conference proceedings]
United States of America, National Peanut Council; **United States of America**, Peanut Butter Manufacturers Association
Manufacturing Confectioner 55 (1) 22-23, 25, 27-28, 32-33, 35, 37-38, 41 (1975) [En]

Abstracts are presented of papers from the 'Aflatoxin quality control seminar': Food safety: a regulatory and legislative overview, by C. Feldberg; Aflatoxin research: current status and outlook, by C. J. Kensler; Proposed tolerance for aflatoxin in peanuts, by J. R. Wessel; Compliance with FDA regulations, by W. F. Randolph; The Peanut Marketing Agreement and the Peanut Administrative Committee, by J. A. Miller; The role of peanut growers and peanut shellers, by D. W. Sands; Peanut purchasing, transportation, receiving and storage, by M. H. Kremzar; Receiving and sampling criteria for raw peanuts and finished peanut products, by P. J. Tiemstra; Test method and handling practices based upon test results, by J. Maselli; Cleanup procedures:

Photoelectric sorters, handpicking, and roast and blanching, by R. P. Allen; and Custom blanching procedures, by C. B. Smith. VJG

34

Production of aflatoxins B_1 and G_1 by Aspergillus flavus and Aspergillus parasiticus isolated from market pecans.

Koehler, P. E.; Hanlin, R. T.; Beraha, L.

Applied Microbiology **30** (4) 581-583 (1975) [7 ref. En] [Dep. of Food Sci., Univ. of Georgia, Athens, Georgia 30602, USA]

148 isolates of Asp. flavus and Asp. parasiticus were isolated from 5608 pecans obtained from Chicago and Georgia markets. % of internal contamination by these species was 7.3% in the Chicago market pecans and 1.7% in those from markets in Georgia. Of the 148 isolates, 93% of the Asp. parasiticus, but only 54% of the Asp. flavus, were capable of producing aflatoxin. Overall, 57% of the isolates were potentially aflatoxigenic. Asp. paraciticus isolates generally produced a greater amount of aflatoxins than Asp. flavus. AS

35

Aflatoxin occurrence in 1973 corn at harvest. I. A limited survey in the southeastern U.S.

Lillehoj, E. B.; Kwolek, W. F.; Shannon, G. M.; Shotwell, O. L.; Hesseltine, C. W.

Cereal Chemistry **52** (5) 603-611 (1975) [22 ref. En] [N. Regional Res. Lab., Peoria, Illinois 61604, USA]

Freshly harvested corn (18% moisture, average) from the 1973 crop was examined for Aspergillus flavus-induced bright greenish-yellow (BGY) fluorescence and for aflatoxin. The survey was carried out in a limited area (2000 square miles) of northeastern South Carolina. A total of 297 10-lb samples of shelled corn were collected; 184 samples were collected at field sites, and 113 at elevator delivery points during harvest. Corn samples were dried to 13% moisture, or below, within 6 h (mean time) after collection. Of the samples, 216 exhibited BGY fluorescence in whole and ground fractions, and 94 of the samples contained aflatoxin B_1 at >20 parts/billion. The results show that aflatoxin contamination of the corn occurred prior to harvest. Preliminary observations indicated a relation between insect damage and presence of the toxin. However, a clear cause-effect association between insect activity and Asp. flavus infection was not established. AS

36

Effect of some neutral fats on aflatoxin production.

Schultz, D. L.

Dissertation Abstracts International, B **36** (2) 588: Order no. 75-16189 (1975) [En] [Washington State Univ., Pullman, Washington, USA]

37

Thermal inactivation of conidia from Aspergillus flavus and Aspergillus parasiticus. I. Effects of moist heat, age of conidia, and sporulation medium.

Doyle, M. P.; Marth, E. H.

Journal of Milk and Food Technology **38** (11) 678-682 (1975) [7 ref. En] [Dep. of Food Sci., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Thermal resistance at 45°, 50°, 55°, and 60°C of conidia from various strains of Asp. flavus and Asp. parasiticus was determined using a heating menstruum buffered at pH 7.0 with KH_2PO_4-NaOH. Heat resistance of conidia from both moulds was strain-dependent. With moist heat at 45°C, D values for conidia from various strains ranged from 14 to >161 h, whereas at 60°C the range was 8-59 s. At 50° and 55°C, D values ranged from 16 to 987 and 3 to 29 min, respectively. There appeared to be a positive relationship between the degree of heat resistance of conidia and the amount of aflatoxin produced by the different aspergilli. Conidia that were 15 and 20 days old were less resistant to heat than when they were 7 or 10 days old. Conidia that were produced on a substrate low in protein and high in glucose were more heat resistant than were those produced on a more proteinaceous substrate that contained little glucose. AS

38

A multiple inoculation technique for the screening of fungal isolates for the evaluation of growth and mycotoxin production on agar substrates.

Barr, J. G.; Downey, G. A.

Journal of the Science of Food and Agriculture **26** (10) 1561-1566 (1975) [11 ref. En] [Queen's Univ., Belfast, UK]

A simple, rapid and quantitative method for evaluation of radial growth and mycotoxin production by a number of toxigenic fungi on an agar substrate is described. A multiple inoculation technique permits rapid inoculation of large numbers of fungal isolates which yield concentric colonies of reproducible diam. after 72 h incubation. No significant variation in the amount of toxin produced by colonies derived from replicate inoculations of the same fungus on different Petri dishes was detected. The reproducibility of toxin production by replicate colonies on agar was satisfactory and the efficiency of toxin extraction was not influenced by the concn. of toxin in agar. AS

39

Experimental production of aflatoxin in citrus products.

Alderman, G. G.

Dissertation Abstracts International, B **35** (5) 2325: Order No. 74-18916 (1974) [En] [Wisconsin Univ., Madison 6, Wisconsin, USA]

Results from experiments on production of aflatoxins B_1 and G_1 by growth of Aspergillus flavus and A. parasiticus in juice and on peel of grapefruit, lemon, orange and lime, are summarized. PG

40

Fluorescence in pistachio nuts contaminated with aflatoxin.
Dickens, J. W.; Welty, R. E.
Journal of the American Oil Chemists' Society **52** (11) 448-450 (1975) [8 ref. En] [USDA, N. Carolina State Univ., Raleigh, N. Carolina 27607, USA]

Bright greenish-yellow fluorescence under long wave UV light was observed on the shells of 7% of the nuts in samples from 46 aflatoxin contaminated commercial lots of Iranian pistachio nuts. Kernels from the fluorescent nuts contained 50% of the aflatoxin in the samples. No aflatoxin was found in any of the shells. When kernels and shells were cultured, toxicogenic fungi grew from only 4% of the shells and 21% of the kernels from fluorescent nuts and from 9% of the shells and 15% of the kernels from nonfluorescent nuts. AS

41

An evaluation of potential mycotoxin-producing molds in corn meal.
Bullerman, L. B.; Baca, J. M.; Stott, W. T.
Cereal Foods World **20** (5) 248-250 (1975) [6 ref. En] [Dep. of Food Sci. & Tech., Univ. of Nebraska, Lincoln, Nebraska 68503, USA]

Incidence of moulds in retail corn meal samples (6 white and 6 yellow brands) varied with brand and ranged from 25 to 59 550 propagules/g. Predominant types of mould found were Penicillium, Aspergillus, Fusarium and Mucor. Growth of these moulds on rice powder-corn steep agar revealed aflatoxins, sterigmatocystin and penicillic acid in culture extracts. Aspergillus and Fusarium isolates were more toxic than Penicillium isolates. No aflatoxins were detected incorn meal from which the Asp. flavus strain was isolated, but the organism produced aflatoxin B_1 and B_2 in sterile moistened corn meal, but not in unsterilized meal containing a mixed flora. These observations suggest that there are conditions under which toxins are not produced, particularly when toxic moulds are growing in competition with other microorganisms. VJG

42

Mycotoxin in foodtuffs. V. The influence of temperature, acidity and light on the formation of aflatoxins and patulin in bread.
Reiss, J.
European Journal of Applied Microbiology **1** (2) 183-190 (1975) [17 ref. En] [Mikrobiol. Lab., Grahamhaus Studt KG, D-6550 Bad Kreuznach, Federal Republic of Germany]

The optimal temp. for the growth of Aspergillus parasiticus and the formation of aflatoxins B_1 and G_1 on whole wheat bread "Graham" (sliced and packed in cellulose foil) was 25°C. The optimal "total acid content" (Säuregrad) was 5.0. Incubation in light caused no reduction in aflatoxin yields. The optimal temp. for the growth of Penicillium expansum on whole wheat bread was 10°C and was between 20° and 25°C for the biosynthesis of patulin. Patulin formation was not influenced by the "total acid content" but was greater under the influence of light than darkness. With increase of incubation time the yields of patulin decreased, probably due to an inactivation by SH-compounds. [See FSTA (1972) 4 3M464 for part III.] AS

43

Fluorescence associated with corn infected with Aspergillus flavus and A. parasiticus in storage.
Rambo, G.; Tuite, J.; Zachariah, G. L.
Cereal Chemistry **52** (6) 757-764 (1975) [11 ref. En] [Purdue Univ., West Lafayette, Indiana 47907, USA]

2 yellow dent corn hybrids were inoculated with Asp. flavus and Asp. parasiticus and stored in static and aerated systems. 2 fluorescences were observed under black light in the inoculated grain: bright greenish yellow (BGYF) and blue white (BWF). The incidence of these fluorescences varied with each isolate in relation to storage conditions. The Asp. parasiticus inoculated grain had more BWF than BGYF, whereas corn inoculated with Asp. flavus had similar amounts of both fluorescences. The correlation between the incidence of either the BGYF or BWF and aflatoxin in individual kernels was 74-80% for Asp. parasiticus, a good aflatoxin producer, but very low for Asp. flavus, a poor toxin producer. Aflatoxin occurred in 6.7 and 19.6% of the nonfluorescing kernels selected from the static and aerated tests, respectively. AS

44

[Rational packaging of meat and sausage products in retail packs.] Rationelle Verpackung von Wurst und Fleischwaren in Händlerpackungen.
Köpnick, K. D.
Fleischerei **26** (4) 15-16, I (1975) [De, en, fr] [Grace GmbH, D-2000 Norderstedt, Postfach 109, Federal Republic of Germany]

45

Aflatoxin residues in tissues of growing swine: effect of separate and mixed feeding of protein and protein-free portions of the diet.
Murthy, T. R. K.; Jemmali, M.; Henry, Y.; Frayssinet, C.
Journal of Animal Science **41** (5) 1339-1347 (1975) [27 ref. En] [Sta. de Biochimie et Physicochimie des Cereales, 13 Rue Nicolas Fortin 75 013, Paris, France]

12 female Large White swine (live wt. approx. 20 kg at the start of the experiment) were used in a feeding trial in which peanut meal contaminated with aflatoxins was fed either (i) mixed with the non-protein portion of the diet or (ii) separately from the non-protein portion of the diet. The peanut meal used contained <3986 μg aflatoxin B_1, ≤635 μg aflatoxin B_2, ≤526 μg aflatoxin G, and ≤153 μg aflatoxin G_2/kg DM. The pigs were

slaughtered after ≤36 days on the experimental diets, and aflatoxins were determined in liver, gall bladder, spleen, heart, muscle and kidney. No aflatoxins were detected in tissues of pigs fed (i). Aflatoxins were detected in all the studied tissues of pigs fed (ii), the highest observed concn. being 6.10 μg aflatoxin B_1/kg in liver. AJDW

46

Fluorescence changes of aflatoxins B_1 and G_1.
Prasanna, H. R.; Gupta, S. R.; Viswanathan, L.; Venkitasubramanian, T. A.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **159** (6) 319-322 (1975) [15 ref. En, de] [Dep. of Biochem., Vallabhbhai Patel Chest Inst., Univ. of Delhi, India]

The effects of various factors, such as pH, buffer, NaCl and UV radiation, on the fluorescence of aflatoxins B_1 and G_1 were studied. The fluorescence characteristics of aflatoxins B_1 and G_1 underwent a marked change at pH values above 7.2. Prolonged exposure to UV radiation produced some degradation of aflatoxins and the extent of degradation was dependent upon the nature of the solvent. NaCl partially protected the toxins from degradation by UV radiation or alkaline conditions. AS

47

Rapid screening method for aflatoxin in a number of products.
Holaday, C. E.; Lansden, J.
Journal of Agricultural and Food Chemistry **23** (6) 1134-1136 (1975) [8 ref. En] [Nat. Peanut Res. Lab., USDA, S. Region, Dawson, Georgia 31742, USA]

An improved qualitative minicolumn procedure for screening a number of products [e.g. peanut butter and meal, corn, rice, cottonseed meal] for aflatoxin is presented. High-speed blending of the sample with aqueous methanol followed by purification with zinc acetate and re-extraction with benzene before subjecting to minicolumn chromatography is a simple, economical, and rapid method for aflatoxin detection. Sensitivities of 2 parts/billion can be achieved and the use of disposable plastics and glass items makes the method practical for field or in-plant application. AS

48

Systematic analysis of mycotoxins by thin-layer chromatography.
Durackova, Z.; Betina, V.; Nemec, P.
Journal of Chromatography **116** (1) 141-154 (1976) [29 ref. En] [Dep. of Tech. Microbiol. & Biochem., Slovak Polytechnic Univ., Janska 1, 880 37 Bratislava, Czechoslovakia]

Analysis of 37 mycotoxins and other fungal metabolites by TLC is described. Their R_f values in 8 solvent systems, colour reactions after chemical detection and detection under UV light are presented. detection and detection under UV light are presented. Chromatographic spectra were constructed from the R_f values, which, together with data on mp, mol. wt., mass and IR spectra etc., can help in identifying unknown mycotoxins. AL

49

Bioautographic detection of mycotoxins on thin-layer chromatograms.
Durackova, Z.; Betina, V.; Nemec, P.
Journal of Chromatography **116** (1) 155-161 (1976) [6 ref. En] [Dep. of Tech. Microbiol. & Biochem., Slovak Polytechnic Univ., Janska 1, 880 37 Bratislava, Czechoslovakia]

A method for bioautographic detection of mycotoxins on thin layer chromatograms by using Artemia salina larvae is described. The method was tested on standard samples of mycotoxins (aflatoxin B_1, kojic acid and sterigmatocystin) and on extracts from toxinogenic fungi isolated from various foodstuffs. The method is simple and reproducible, and could be applied to screening mycotoxins in contaminated foodstuffs and raw materials for foods. AL

50

Effect of initial pH on aflatoxin production.
Buchanan, R. L., Jr.; Ayres, J. C.
Applied Microbiology **30** (6) 1050-1051 (1975) [4 ref. En] [Dep. of Food Sci., Univ. of Georgia, Athens, Georgia 30602, USA]

The effect of initial pH on aflatoxin production by Aspergillus parasiticus NRRL 2999 was examined in a semisynthetic medium. Maximal growth, aflatoxin production, and aflatoxin production per unit of growth occurred at initial pH levels of 5.0, 6.0, and 7.0, respectively. Initial pH levels <pH 6.0 favoured production of the B toxins, whereas levels >pH 6.0 favoured production of the G toxins. AS

51

[Aflatoxins in nuts.]
Nilsson, G.; Akerstrand, K.; Slorach, S.
Var Föda **26** (3) 56-62 (1974) [11 ref. Sv]

Aflatoxins were determined in kernels of in-shell (i) Brazil nuts (23 batches), (ii) hazel nuts (12 batches) and (iii) walnuts (1 batch). A table of results (total aflatoxin concn.) is given, broken down by nut type and quality (edible, possibly edible, inedible). Aflatoxins were detected in all batches of (i) studied; concn. ≥10 000 μg/kg were recorded in kernels possibly or certainly unfit for consumption; edible kernels contained ≤20 μg/kg. Low aflatoxin concn. (≤10 μg/kg) were detected in 1 sample of edible (ii), and in 2 samples of possibly edible (ii). No aflatoxins were detected in (iii). AJDW

52

The analysis of spices and herbs for aflatoxins.
Scott, P. M.; Kennedy, B. P. C.
Canadian Institute of Food Science and Technology Journal 8 (2) 124-125 (1975) [13 ref. En] [Health Protection Branch, Health & Welfare Canada, Ottawa, Ontario, Canada]

11 types of spice and 4 herbs were examined for mycotoxin content, with reference to applicability of available analytical methods. 132 different samples obtained from processors were tested, separation and estimation of extracted aflatoxins being carried out by 2-dimensional TLC. Samples of cinnamon, ginger, marjoram, rosemary, sage, thyme, garlic and onion powders, and celery, cumin and dill seeds contained no detectable aflatoxins. Aflatoxins were detected in a total of 19 samples of 4 spices. Incidence of toxins ($\geq$2.5 and 1.3 μg/kg for aflatoxins B_1 and G_1, and B_2 and G_2, respectively) was: B_1, 12 samples; B_2, 7 samples; G_1, 2 samples; G_2, 1 sample. Max. measurable concn., and numbers of toxin-containing samples were (μg/kg): coriander (1 sample) B_1 45.5, B_2 16; ginger, (8 samples) B_1 12.5, B_2 15, G_1 15, G_2 4; nutmeg, (4 samples) B_1 37.5, B_2 15; and turmeric, (6 samples) B_1 3.8, B_2 1.3. JRR

53

Circumstances associated with the contamination of food by aflatoxin in a high primary liver cancer area.
Rensburg, S. J. van; Kirsipuu, A.; Continho, L. P.; Watt, J. J. van der
South African Medical Journal 49 (22) 877-883 (1975) [8 ref. En] [S. African Med. Res. Council, Parowvallei, Cape Province, South Africa]

Methods of food production, storage and processing and eating habits were studied among the coloured population in the district of Inhambane and Beira in Mozambique. High aflatoxin contamination was found in dry stored food available to the households, e.g. 153 samples of groundnuts contained 1036.0 μg/kg and 65 samples of beans 12.6 μg/kg. Aflatoxin was found to be particularly prevalent in prepared dishes containing groundnuts, pumpkin leaves, cassava and cacara leaves. EJM

54

[Rapid chromatographic method for determination of mycotoxins.]
Burzynska, H.; Maciejska, K.
Roczniki Panstwowego Zakladu Higieny 26 (6) 671-674 (1975) [4 ref. Pl, ru, en] [Panstwowy Zaklad Higieny, Warsaw, Poland]

The usefulness of chromatography with slides covered with silica gel was assessed in detection and quantitative detn. of aflatoxins B_1, B_2 and G_2, ochratoxin A and sterigmatocystin. This method allows the following amounts of mycotoxins to be demonstrated: aflatoxins B_1, B_2, G_2 0.0005 μg; ochratoxin A 0.005 μg; and sterigmatocystin 0.01 μg. AS

55

[Incidence of toxigenic Aspergillus flavus strains in Soviet food products.]
Bogoroditskaya, V. P.
Voprosy Pitaniya No. 6, 47-51 (1975) [16 ref. Ru, en] [Inst. Pitaniya AMN SSSR, Moscow, USSR]

813 agricultural products, samples of which were taken during the 1970-1973 harvest or during predistribution storage, were analysed for presence of Asp. flavus; wheat, rye, soybeans, sunflower and rice were the main products. A similar analysis was made of 155 good-quality food products from the retail network; various types of groats, dried fruits, cheese and bread were the main items. 69 samples were contaminated with Aspergillus, of which 32 were Asp. flavus. None of the UV fluorescent components characteristic of aflatoxins were found in any of the 968 samples examined; however, 25 strains from the agricultural products were found to be capable of the UV fluorescence typical of aflatoxins. HBr

56

Detection of twelve mycotoxins in mixed animals feedstuffs, using a novel membrane cleanup procedure.
Roberts, B. A.; Patterson, D. S. P.
Journal of the Association of Official Analytical Chemists 58 (6) 1178-1181 (1975) [13 ref. En] [Cent. Vet. Lab., Weybridge KT15 3NB, UK]

A multimycotoxin TLC screening method is described which is applicable to most animal feedstuffs and also to detn. of aflatoxin M_1 in milk. Interference from nonspecific lipid, pigment, and other components of simple and mixed feeds is reduced to a min. by using a membrane cleanup step. Aflatoxins B_1, B_2, G_1, and G_2, citrinin, diacetoxyscirpenol, ochratoxin A, patulin, penitrem A, sterigmatocystin, T-2 toxin, and zearalenone may be reliably detected. The sensitivity of the method is generally low for mixed feeds but even so aflatoxin B_1 can be detected at a level of 3 ppb (parts/billion) and ochratoxin A at 80 ppb. While the basic method is less sensitive for sterigmatocystin (330 ppb), patulin (600 ppb), zearalenone (1000 ppb), and the trichothecenes (1000-4000 ppb), it may be adapted so as to reduce the above detection limits when the presence of these toxins is suspected. Lower levels may be detected in extracts of simple feeds. AS

57

Detection and determination of aflatoxins B_1, B_2, G_1, G_2, M_1, M_2 and parasiticol in cereals and milk.
Janicki, J.; Szebiotko, K.; Chelkowski, J.; Kokorniak, M.; Godlewska, B.; Wiewiorowska, M.

Acta Alimentaria Polonica **1** (3/4) 207-219 (1975) [19 ref. En, pl] [Inst. Tech. Zywnosci Pochodenia Roslinnego, AR, Poznan, Poland]

Contents of aflatoxins B_1, B_2, G_1, G_2, M_1 and M_2 in samples of commercial dried milk and of 4 cereals (wheat, rye, barley and oats) were investigated. The effectiveness of aflatoxin detection tests was determined on model cereal samples. To confirm the presence of aflatoxins on a single chromatogram the most useful method was to spray the plates with a 25% solution of H_2SO_4 and transform aflatoxins B_1, G_1 and M_1 into their water adducts. No aflatoxins were detected in dried milk samples obtained from dairies in the Poznan province, and aflatoxin B_1 and G_1 were detected in 1 wheat sample of the 35 cereal samples tested. Trials carried out at 4 different temp. (4-6°, 10-12°, 17-20°, and 28-30°C) for 7 days showed that strains of Aspergillus flavus and Asp. parasiticus were able to synthesize considerably quantities of aflatoxins B_1 and G_1 on autoclaved meals of the 4 cereals even at temp. <10°C. At 28-30°C biosynthesis was much greater at 45% moisture than at 12% moisture content. AL

58

Quantitative removal of aflatoxins from thin-layer chromatographic plates. [Lecture]

Issaq, H. J.; Barr, E. W.; Zielinski, W. L., Jr.

Journal of Chromatographic Science **13** (12) 597-598 (1975) [11 ref. En] [NCI Frederick Cancer Res. Cent., Frederick, Maryland 21701, USA]

A method involving in situ elution of aflatoxin spots directly from the TLC plate without concomitant removal of the silica gel surface is reported. The method is rapid, reliable and quantitative, and involves prewetting the aflatoxin spot with a small amount of water prior to in situ elution with acetone. AL

59

Effect of sodium acetate on growth and aflatoxin production by Aspergillus parasiticus NRRL 2999.

Buchanan, R. L., Jr.; Ayres, J. C.

Journal of Food Science **41** (1) 128-132 (1976) [12 ref. En] [Dep. of Food Sci., Univ. of Georgia, Athens, Georgia 30602, USA]

The effect of sodium acetate and propionate on growth and aflatoxin production by Asp. parasiticus NRRL 2999 was studied in AMY medium (modified Adye & Mateles medium [Applied Microbiology (1971) **22**, 79] + 2% yeast extract) to determine the possible use of these compounds as a means of controlling aflatoxin production. At pH 4.5, concn. of sodium acetate $\geqslant$1.0 g/100 ml completely inhibited growth and prevented aflatoxin production, while levels of 0.6 and 0.8 g/100 ml partially inhibited growth and decreased aflatoxin production by 70% and 99%, respectively. Examination of the effect of initial pH on the inhibitory action of sodium acetate indicated that the extent of inhibition was a function of the initial pH. The effect of propionic acid on growth and aflatoxin production was also examined, and this compound was found to be more inhibitory than acetate. The role of sodium acetate and propionic acid as a means of controlling aflatoxin production appears to be promising. IFT

60

Mycotoxins in foodstuffs. IX. Prevention of the formation of mycotoxins in whole wheat bread by citric acid and lactic acid.

Reiss, J.

Experientia **32** (2) 168-169 (1976) [12 ref. En] [Mikrobiol. Lab., Grahamhaus Studt KG, D-655 Bad Kreuznach, Federal Republic of Germany]

Whole-wheat bread (Grahambrot) was prepared with additions of 0.25, 0.5 and 0.75% of citric or lactic acid. 3-slice samples were packaged in cellulose film and sterilized in hot steam. Total acid content was determined and the packages were inoculated with spores of Aspergillus parasiticus, Asp. versicolor and Penicillium expansum. After incubation for $\leqslant$10 days at 22°C, bread samples were examined for fungal growth and mycotoxin (aflatoxin, patulin, sterigmatocystin) production. Formation of aflatoxins by Asp. parasiticus was suppressed by 0.5% citric acid and by 0.75% lactic acid. Formation of sterigmatocystin by Asp. versicolor was suppressed by 0.25% citric acid and by 0.5% lactic acid. Neither citric not lactic acid had any influence on production of patulin by P. expansum. [See FSTA (1976) **8** 4M492 for part V.] JA

61

[Fungal contamination. I. Bakery products.]

Cirilli, G.; Cirilli, A. R.; Bagnacani, L.; Chiari, E.; Pandini, E.

Industrie Alimentari **14** (12) 60-62 (1975) [4 ref. It] [Lab. de Chimia Analytica Applicata, Bologna, Italy]

A brief illustrated account is given of studies on fungal contamination of sliced, wrapped bread. Moulds isolated included Mucor mucedo, Aspergillus niger, Asp. glaucus, Asp. flavus, Oidium aurantiacum and Rhizopus nigricans. Cultures of these isolates were tested for production of aflatoxins, urea, oxalic acid, H_2S and fumaric acid. Aflatoxin formation by Asp. flavus was clearly observed; traces of aflatoxins were also detected in cultures of Asp. niger, Asp. glaucus and Rhizopus nigricans. Studies on inhibition of these mould spp. by calcium propionate, sodium propionate, I_2 or UV irradiation are also briefly discussed; only I_2 effectively controlled spore germination and growth. AJDW

62

Problems of aflatoxins in oilseeds and oilcakes: summary and analysis of questionnaire replies.
Food & Agriculture Organization
FAO Commitee on Commodity Problems CCP:OF 74/4. 22pp. (1974) [En] [Rome, Italy]

Information provided by 21 countries on methods of sampling and analysis of aflatoxin contamination in oilseeds and oilcakes, and on regulations on trade and use of contaminated materials was analysed. Analytical methods used in different countries showed sensitivity range of 0.002 ppm (USA, AOAC methods) to 0.040 (Belgium, National Official method). RM

63

Stability of aflatoxin M in milk.
Stoloff, L.; Trucksess, M.; Hardin, N.; Francis, O. J.; Hayes, J. R.; Polan, C. E.; Campbell, T. C.
Journal of Dairy Science 58 (12) 1789-1793 (1975) [16 ref. En] [Bureau of Foods, Food & Drug Administration, Washington, DC 20204, USA]

This is a 3-part study to determine aflatoxin M recovery from pasteurized and/or stored cows' milk: (i) aflatoxin M (2.0 μg/l. milk) was added to samples of raw Holstein-Friesian milk. Half each sample was pasteurized at 63°C for 30 min, and both raw and pasteurized portions were stored at 4°C up to 17 days; (ii) samples of raw milk, pasteurized (77°C, 16 s) skim-milk, dry Cottage cheese curd and Cottage cheese whey were taken from an area naturally contaminated; and (iii) milk from a cow dosed with aflatoxin B_1, was stored frozen (-18°C) in bulk and in assay-size sample containers for 120 days. Aflatoxin M was recovered completely after either storage or pasteurization in (i) and (ii). In (iii), a recovery deficiency was detectable after 68 days of storage, which increased to 45% of the original value by 120 days. In aflatoxin M partitioning between curd and whey in the preparation of Cottage cheese, half or more aflatoxin M stayed with the whey. These observations differ from past reports [FSTA (1973) 5 1P49 & 5 10P1488]; 3 possible explanations for the differences are given. LMB

64

[Aflatoxins in milk and milk products.]
Goded y Mur, A.
Revista Espanola de Lecheria No. 98, 231-235 (1975) [3 ref. Es]

This short review article deals with the structure of the various aflatoxins, their origin, toxicity and chemical characteristics, legislation in different countries, and methods of detn. (official methods, and variants introduced by different workers). ADL

65

Examination of Swiss cheese for incidence of mycotoxin producing molds.
Bullerman, L. B.
Journal of Food Science 41 (1) 26-28 (1976) [13 ref. En] [Dep. of Food Sci. & Tech., Univ. of Nebraska, Lincoln, Nebraska 68503, USA]

11 brands of Swiss cheese were randomly selected for plate count examination. Mould counts ranged from <10 to 1580 colonies/g of surface cheese at 5°C incubation and <10-5700 at 21°C. Most of the moulds detected were capable of growing at 5°C in 6 wk. Of the 183 moulds isolated, 87% were Penicillium and 13% other genera including 1 isolate of Aspergillus flavus. The culture extracts were tested for toxicity to 7-day-old chicken embryos and analysed for the presence of mycotoxins using thin-layer chromatography. 34% of all isolates were toxic, including 35% of penicillia. Mycotoxins (aflatoxins, penicillic acid and patulin) were detected in 5.5% of isolates. LMB

66

[The toxigenic action of aflatoxin-producing Aspergillus flavus strains.]
Jacquet, J.; Tantaoui, E.; Boutitbonnes, P.
Comptes Rendus des Seances de l'Academie d'Agriculture de France 61 (7) 374-378 (1975) [Fr] [Lab. de Microbiol., Univ. de Caen, Caen, France]

The toxigenic action of 957 Asp. flavus strains isolated from various food products was investigated. Only 17.9% of toxigenic strains were of European origin and no strain from a culture collection was toxigenic. Subculturing by single-spore culture showed that toxin production was transmitted, though some atoxigenic spores produced toxigenic colonies. In mixed culture, the growth of toxigenic colonies was repressed by atoxigenic ones. RM

67

[Aflatoxins in some Spanish foods.]
Sanz Perez, B.; Palacios Asenjo, P.; Tormo Iguacel, J.; Lopez Lorenzo, P.
Anales de Bromatologia 25 (3) 297-319 (1973) [40 ref. Es, en] [Dep. de Higiene y Tecnologia de los Alimentos, Fac. de Vet., Univ. Complutense de Madrid, Spain]

Aspergillus flavus and Asp. parasiticus grew well in chorizo (a Spanish sausage), Manchego cheese and black olives, and produced aflatoxins. The following concn. were found in contaminated foods (respectively, aflatoxins B_1, G_1, B_2 and G_2, μg/kg): cheese 250, 250, 75, 75; olives and chorizo 125, 125, 37.5, 37.5; fresh peanuts 500, 500, 150, 150. Methods of culture, extraction and detn. are detailed. RM

68

Collaborative study of a screening method for the detection of aflatoxins in mixed feeds, other agricultural products and foods.
Romer, T. R.; Campbell, A. D.
Journal of the Association of Official Analytical Chemists 59 (1) 110-117 (1976) [7 ref. En] [Ralston Purina Co., Checkerboard Square, St. Louis, Missouri 63188, USA]

A screening method for aflatoxins was collaboratively tested on 11 different agricultural and food products: white and yellow corn, peanuts, peanut butter, pistachio nuts, peanut meal, cottonseed meal, chicken, pig and turkey starter rations, and dairy cattle feed. The method involves a rapid extraction and cleanup procedure followed by the detection of total aflatoxins ($B_1 + B_2 + G_1 + G_2$) as a fluorescent band on the Florisil layer of a Velasco-type minicolumn. The results of 32 collaborators from 10 different countries are presented. Samples containing 0, 5, 10, 15, 20 and 25 µg aflatoxins/kg were analysed. 84% of the negative samples and 89% of the samples containing 10-25 µg total aflatoxins/kg were correctly identified. This method has been adopted as official first action for the detection of aflatoxins in corn, peanuts, peanut butter, peanut meal, cottonseed meal, mixed feeds, and pistachio nuts. AS

69

Resolution of aflatoxins B_1, B_2, G_1, and G_2 by high-pressure liquid chromatography.
Pons, W. A., Jr.
Journal of the Association of Official Analytical Chemists 59 (1) 101-105 (1976) [19 ref. En] [S. Regional Res. Cent., USDA, PO Box 19687, New Orleans, Louisiana 70179, USA]

Aflatoxins were completely resolved as sharp peaks in the order B_1-B_2-G_1-G_2 by high-pressure liquid chromatography on a small particle (10 µm) porous silica gel column in 7-13 min (B_1 through G_2) by a water-saturated chloroform-cyclohexane-acetonitrile elution solvent (25 + 7.5 + 1.0), with detection by UV absorbance at 360 nm. The relationship between peak height and amount injected was linear over a 5-400 ng range for each aflatoxin. Both retention times and peak heights were highly reproducible, multiple injections of mixed standards giving coeff. of variation of 1.0-1.4% (retention time) and 1.6-2.8% (peak height) for the 4 aflatoxins. Detection was highly sensitive, with mean peak height, mm/ng, of 7.1 (B_1), 6.4 (B_2), 4.5 (G_1), and 4.1 (G_2), allowing detection of 1-2 ng of each aflatoxin. AS

70

Information relating to the wholesomeness of irradiated food: effect of γ-radiation on the microbiology and chemical properties of peanuts.
Food & Agriculture Organization, Joint FAO/IAEA Division of Atomic Energy in Food & Agriculture
Food Irradiation Information No. 4, 70 [LXX] (1975) [1 ref. En] [Food Res. Lab., Nat. Inst. of Sci. & Tech., Herran St., Manila, Philippines]

Shelled peanuts packaged in multi-wall paper bags were γ-irradiated at 0-150 krad and stored for 10 months at 27-30°C. Aflatoxin contamination during storage was controlled at 100 and 150 krad. Free fatty acid contents changed slightly at ≤150 krad, increased 5-6 times at >150 krad. Thiobarbituric acid values were negative for both irradiated and non-irradiated samples. RM

71

[Sanitary examination in the baking industry with special reference to aflatoxin.]
Umgebungsuntersuchungen in der Backwarenindustrie. Beachtung des Aflatoxin-Problems.
Kowatsch, R.; Eggensperger, H.
Gordian 76 (1) 6, 8-9 (1976) [De, en]

72

[Mycotoxins in foods. VIII. Inhibition of mould growth and synthesis of mycotoxins (aflatoxins B_1 and G_1, patulin, sterigmatocystin) in wheat wholemeal bread by means of sorbic acid and sorboyl palmitate.] Mycotoxine in Nahrungsmitteln. VIII. Hemmung des Schimmelpilzwachstums und der Bildung Mycotoxinen (Aflatoxine B_1 und G_1, Patulin, Sterigmatocystin) in Weizenvollkornbrot durch Sorbinsäure und Sorboylpalmitat.
Reiss, J.
Deutsche Lebensmittel-Rundschau 72 (2) 51-54 (1976) [22 ref. De, en, fr] [Mikrobiol. Lab., Grahamhaus Studt KG, 6550 Bad Kreuznach, Federal Republic of Germany]

Effects of addition of sorbic acid (0.1, 0.3 or 0.5%) or sorboyl palmitate (0.1, 0.3, 0.5 or 0.75%) on the growth of Aspergillus parasiticus (an aflatoxin-producing sp.), Asp. versicolor (a sterigmatocystin-producing sp.) and Penicillium expansum (a patulin-producing sp.) on sliced whole-wheat bread packaged in cellophane film were studied. Control bread samples contained no preservative. Inoculated bread samples were incubated for ≤20 days at 23-25°C. At intervals, mould growth and mycotoxin formation were evaluated; tables and graphs of results are given. It is concluded that addition of 0.1% sorbic acid prevents growth and toxin production by Asp. versicolor and P. expansum, and considerably inhibits growth and toxin formation by Asp. parasiticus. Addition of 0.5% sorboyl palmitate totally inhibits growth and toxin production by Asp. versicolor; Asp. parasiticus and P. expansum can still grow at this concn., but mycotoxin production is inhibited. AJDW

73

Survey of US wheat for ochratoxin and aflatoxin.
Shotwell, O. L.; Goulden, M. L.; Hesseltine, C. W.
Journal of the Association of Official Analytical Chemists **59** (1) 122-124 (1976) [11 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois, USA]

A total of 291 hard red winter wheat samples, 286 hard red spring wheat samples, and 271 soft red winter wheat samples were analysed for the presence of ochratoxin and aflatoxin. Samples in all grades came from those collected during crop years 1970-1973 for grade detn. by the Agricultural Marketing Service, USDA. Sensitivity limits of the analytical method as carried out were 1-3 ppb (parts/billion) aflatoxin B_1 and 15-30 ppb ochratoxin A. No aflatoxin was detected in any sample. 3 samples of hard red winter wheat (Grades US No. 4 and 5 and Sample Grade) contained ochratoxin A (trace, 35, and 25 ppb, respectively). 8 of the hard red spring wheats contained ochratoxin A (15-115 ppb); these were in Grades US No. 4 and 5 and Sample Grade. AS

74

Epidemic of hepatitis in man due to aflatoxicosis.
Anon.
Nutrition Reviews **34** (2) 4546 (1976) [6 ref. En]

Consumption of maize contaminated with Aspergillus flavus apparently resulted in an epidemic of hepatitis affecting man and pet dogs in parts of Western India. The people affected must have consumed 2-6 mg of aflatoxin daily for almost one month. AS

75

Screening method for the detection of aflatoxin, ochratoxin, zearalenone, penicillic acid, and citrinin.
Wilson, D. M.; Tabor, W. H.; Trucksess, M. W.
Journal of the Association of Official Analytical Chemists **59** (1) 125-127 (1976) [19 ref. En] [Dep. of Plant Path., Univ. of Georgia Exp. Sta., Coastal Plain Sta., Tifton, Georgia 31794, USA]

A modification of the official method for ochratoxins and a screening method for zearalenone, aflatoxin, and ochratoxin is described and expanded to include citrinin and penicillic acid. The method uses 0.5N phosphoric acid-chloroform (1 + 10) in the initial extraction; the extract is divided and eluted from 2 columns to provide a quantitative TLC method for aflatoxin and ochratoxin in corn and dried beans. Aflatoxin and zearalenone are eluted from one column and ochratoxin, penicillic acid, and citrinin from the other. Ochratoxin A recoveries are low (50%) in peanuts. Zearalenone, penicillic acid, and citrinin were qualitatively recovered from corn and beans; zearalenone and penicillic acid were recovered from peanuts but citrinin was not. Several TLC solvents were used to separate interferences. AS

76

Use of water slurries in aflatoxin analysis.
Velasco, J.; Morris, S. L.
Journal of Agricultural and Food Chemistry **24** (1) 86-88 (1976) [6 ref. En] [USDA, Agric. Marketing Res. Inst., Beltsville, Maryland 20705, USA]

A method based on the use of water slurries for aflatoxin analysis enables aliquots from kg size samples, to be analysed without an increase in solvent or reagent costs. Slurries were prepared in a 1-gal blender and sample wt. to water vol. ratios were 1:1.5 for peanut butter, 1:2.25 for whole seeds, 1:4 for commercial meals, and 1:5 for copra. Extraction of 100-g aliquots of slurry with 200 ml of acetone resulted in aflatoxin yields comparable to those obtained by extraction of dry products by the standard method. Peanuts, peanut butter, peanut meal, cottonseed, cottonseed meal, copra, and corn were successfully analysed by this slurry technique. The precision of slurry analysis for these products, expressed as coeff. of variation (%), ranged from 2.6 to 7.8 compared to 5.7 to 20.8 for analyses by the standard procedure. Determinations were made by fluorometric measurements of aflatoxin adsorbed on the Florisil layer in a minicolumn. AS

77

Effect of water activity and temperature on aflatoxin production by Aspergillus parasiticus.
Northolt, M. D.; Verhulsdonk, C. A. H.; Soentoro, P. S. S.; Paulsch, W. E.
Journal of Milk and Food Technology **39** (3) 170-174 (1976) [7 ref. En] [Lab. voor Zoönosen en Levensmiddelenmicrobiol., Rijks Inst. voor de Volksgezondheid, Bilthoven, Netherlands]

The effect of water activity (a_w) on growth and aflatoxin production by Asp. parasiticus NRRL 2999 was determined using submerged cultures in which the a_w was adjusted by addition of glycerin, glucose, or a mixture of salts. At a sub-optimal a_w, aflatoxin production was low in the glycerol and glucose media while no strong inhibition of mycelial growth occurred. A similar effect was obtained in surface cultures on agar media in which the a_w was adjusted by addition of glycerin or sucrose. The effect of a sub-optimal temp. was the reverse; compared to inhibition of mycelial growth in surface cultures, the effect on aflatoxin production was slight. No detectable quantities of aflatoxin B_1 were formed at 0.83 a_w and at 10°C nor at 4 combinations of higher a_w and temp. The a_w was measured by a recently developed device using the dewpoint principle. AS

78

Ammoniation of aflatoxin B_1: isolation and characterization of a product with molecular weight 206.
Cucullu, A. F.; Lee, L. S.; Pons, W. A., Jr.; Stanley, J. B.
Journal of Agricultural and Food Chemistry **24** (2) 408-410 (1976) [11 ref. En] [S. Regional Res. Cent., USDA, New Orleans, Louisiana 70179, USA]

79

Aflatoxin occurrence in some white corn under loan, 1971: mold flora. [Lecture]
Hesseltine, C. W.; Bothast, R. J.; Shotwell, O. L.
Mycologia **67** (2) 292-408 (1975) [8 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

Representative samples were taken from each of 1283 trucks of corn delivered under US government (Commodity Credit Corporation) loan and examined for aflatoxin and mycological contamination. 82% (1050 truckloads) contained Aspergillus flavus though aflatoxin was found in only 31% (394 truckloads). The fungi identified in the 1283 truckloads, in the 394 contaminated truckloads and in 5 corn grades are tabulated. Only 2% of aflatoxin-positive samples contained no Asp. flavus. [See FSTA (1976) **8** 2M249 for previous part.] RM

80

Survey for aflatoxins and zearalenone in 1973 crop corn stored on farms and in country elevators.
Stoloff, L.; Henry, S.; Francis, O. J., Jr.
Journal of the Association of Official Analytical Chemists **59** (1) 118-121 (1976) [12 ref. En] [Div. of Food Tech., FDA, Washington, DC 20204, USA]

A total of 315 marketable and 57 obviously damaged corn samples were collected at 116 different farms and country elevators located in the USA in counties selected from among those producing >1 million bushels of corn in 1972. The samples were analysed for aflatoxins and zearalenone. The most strinking correlations observed were between geographical area and mycotoxin contamination. Aflatoxin contamination was most frequently encountered in the Southeast-Appalachia areas with a 44% incidence of marketable corn with detectable aflatoxins. Zearalenone was most frequently encountered in the Corn Belt with a 10% incidence in marketable corn from that region. When mycotoxin contamination was found in an establishment, most of the samples from that establishment were contaminated. There was no correlation between mycotoxin contamination and storage practices nor could the observed contamination of marketable corn be related to the contamination ofthe obviously damaged grain. These observations plus correlations with the geographic incidence and aflatoxin level distribution of publiched field contamination data suggest the possibility of a common contamination mode. AS

81

Aflatoxin occurrence in 1973 corn at harvest. I. A limited survey in the Southeastern U.S.
Lillehoj, E. B.; Kwolek, W. F.; Shannon, G. M.; Shotwell, O. L.; Hesseltine, C. W.
Abstracts of the Annual Meeting of the American Society for Microbiology **75**, 197 (1975) [En] [N. Regional Res. Lab., USDA, Peoria, Illinois, USA]

Freshly harvested corn from a region of northeastern S. Carolina was examined for field occurence of aflatoxin. A collection of 297 samples (10 lb each) was made (184 collected at field sites and 113 at elevator delivery points during harvest). Corn samples were dried to 13% moisture or below within 5-7 h of collection. In 91 of 184 field samples (49%) and in 61 of 113 elevator samples (54%), aflatoxin B_1 was found at levels >3 ppb (parts/billion). No significant variation was observed in occurrence of aflatoxin between corn collected in the field and samples obtained at elevators. Aflatoxin B_1 levels >20 ppb were observed in 94 of the 297 samples (32%); 29 of the 297 (10%) had >80 ppb; and 4 contained >320 ppb. A significant association was observed between aflatoxin levels in test corn and moisture levels of grain at harvest. Field observations indicated that insect damage of corn could provide the initial site of fungal infection, but a definite relationship was not found between activity of a specific insect and presence of aflatoxin. However, evidence was conclusive that Aspergillus flavus can develop and produce aflatoxin in the field before harvest. AS

82

Aflatoxin occurrence in 1973 corn at harvest. II. Mycological studies.
Hesseltine, C. W.; Shotwell, O. L.; Kwolek, W. F.; Lillehoj, E. B.; Jackson, W. K.; Bothast, R. J.
Abstracts of the Annual Meeting of the American Society for Microbiology **75**, 198 (1975) [En] [N. Regional Res. Lab., USDA, Peoria, Illinois, USA]

Since aflatoxin is formed in corn in the field before harvest, objective were to determine at harvest: (i) amount of Aspergillus flavus-infected corn kernels, (ii) amount of Asp. flavus spores on corn surface, (iii) total amount of fungus-infected kernels, (iv) occurrence of Asp. flavus spores in and on insects from corn, and (v) correlation between Asp. flavus infection and occurrence of aflatoxin. Corn was collected at harvest and dried quickly to <13% moisture. Of 152 aflatoxin-positive samples, 120 showed ≥1 kernel internally infected with Asp. flavus and of 145 aflatoxin-negative samples, 59 showed infection. Of the 297 samples examined, 276 had ≥1 kernel with surface contamination of Asp. flavus spores, and in 75 of these every kernel was contaminated. When kernels were surface sterilized, 224 samples showed 100% internal mould

contamination. ≥1 kernel of 185 samples was infected with Asp. flavus; this number represents 60% of total samples. Of 375 insects collected and examined for Asp. flavus from corn samples, 247 showed Asp. flavus present. Of 85 rice weevils, 78 were carrying Asp. flavus spores and of the other 290 insects, 165 were contaminated. AS

83

Aflatoxin production and Aspergillus flavus in acid-treated corn.
Bothast, R. J.; Goulden, M. L.; Shotwell, O. L.; Hesseltine, C. W.
Abstracts of the Annual Meeting of the American Society for Microbiology 75, 198 (1975) [En] [N. Regional Res. Lab., USDA, Peoria, Illinois, USA]

Isobutyric acid (IBA) and propionic-acetic acid (PA) were applied to comparable 1500-bushel lots of fresh harvested yellow dent corn containing 27% moisture. After 6 months' storage, 30% Asp. flavus infection and low levels of aflatoxin were detected in adjacent bins of IBA- and PA-treated corn. Extensive samples were taken after 7 months from mouldy locales in each bin and evaluated for mycotoxins and microorganisms. Asp. flavus (10^6 conidia/g) was detected in 33% of PA samples. Also, counts of Asp. fumigatus, absidia, and penicillia were high, but no aflatoxin, zearalenone, or ochratoxin were found. Asp. niger, as well as the moulds found on PA corn, were identified on IBA-treated corn. Asp. flavus (10^4-10^7 conidia/g) were present in 79% of IBA samples, and aflatoxin (2-857 ppb (parts/billion)) was detected in 57%. Aflatoxin contamination varied between locations within a mouldy area. Among 20 individual kernels picked at random from each location, the 0-20% incidence of aflatoxin contamination ranged from 150 to 21 800 ppb in positive kernels. These findings indicate: (i) that the corn kernel is the basic unit for control of moulds and mycotoxins and (ii) that organic acids alter mould growth and reduce mycotoxin formation compared to untreated corn. AS

84

Simple method for simultaneous detection of aflatoxin and zearalenone in corn.
Seitz, L. M.; Mohr, H. E.
Journal of the Association of Official Analytical Chemists 59 (1) 106-109 (1976) [11 ref. En] [US Grain Marketing Res. Cent., USDA, 1515 College Avenue, Manhattan, Kansas 66502, USA]

A method is described of the simultaneous detection of aflatoxin and zearalenone in corn at 5 and 200 ppb (parts/billion) respectively. No evaporation of solvent is required and the procedure is simple enough to be considered for use at marketing locations. The presence or absence of these mycotoxins can be determined in 10-20 min/sample. The procedure involves and initial blender extraction with methanol, partitioning of fat and pigments into 1,1,2-trichlorotrifluoroethane (Freon-113) from an aqueous ammonium sulphate layer, followed by extraction of aflatoxin from the aqueous layer with chlorobenzene. The chlorobenzene extract can be spotted directly onto a TLC plate which requires only 4 min development. Concn. of aflatoxin and zearalenone can be estimated by visual comparison of sample spots with standards. AS

85

Chemical preservatives for prevention of mycotoxin production.
Anon.
Nutrition Reviews 34 (1) 31 (1976) [6 ref. En]

This very brief review concludes that propionic acid should find application in the prevention of mycotoxin formation in stored corn; treatment with NH$_3$ was effective for only a week. [See also FSTA (1975) **7** 7M835.] AL

86

[Aflatoxins and their presence in milk and milk powder.]
Veringa, H. A.; Standhouders, J.; Harten, M. van
Voedingsmiddelentechnologie **8** (35) 9-11 (1975) [Nl, en] [Nederlands Inst. voor Zuivelonderzoek, Ede, Netherlands]

See FSTA (1976) **8** 1P19.

87

Aflatoxin in buffalo milk.
Yadagiri, B.; Tulpule, P. G.
Indian Journal of Dairy Science **27** (4) 293-297 (1974) [15 ref. En] [Nat. Inst. of Nutr., Indian Council of Med. Res., Hyderabad-500007, India]

3 consigments (C1-3) of groundnut cake (10 samples in all) were screened for aflatoxin using TLC and fed as 30% of the diet to Murrah buffaloes. 3 out of the 10 samples were found to contain 1-3 mg/kg aflatoxin B$_1$. The remainder contained only traces and were disregarded. 50 milk samples from these buffaloes were analysed for aflatoxin M$_1$ (metabolite of B$_1$) 10 of the samples came from C1, and 20 each C2 and C3. 4 of C1 showed traces of toxin; 9 C2 and 14 C3 were more heavily contaminated with concn. ranging from traces to 4.8 μg aflatoxin M$_1$/l. milk. LMB

88

A silica gel medium to detect fungi that produce aflatoxin.
Torrey, G. S.; Marth, E. H.
Abstracts of the Annual Meeting of the American Society for Microbiology 74, 10 (1974) [En] [Univ. of Wisconsin, Madison, Wisconsin, USA]

89

Inhibition of growth and aflatoxin production of Aspergillus parasiticus by citrus oils.
Alderman, G. G.; Marth, E. H.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 160 (4) 353-358 (1976) [18 ref. En, de] [Dep. of Food Sci., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Asp. parasiticus was inoculated into grapefruit juice and a glucose-yeast extract medium; both media contained 500-7000 ppm of citrus oils. Orange and lemon oil were more inhibitory to mould growth and aflatoxin production than was d-limonene, the main constituent of the 2 peel oils. After 7 days at 28°C, 2000 ppm of lemon and 3000 ppm of orange oil in grapefruit juice afforded max. suppression of mould growth and toxin formation. When the glucose-yeast extract medium was used, 3000 ppm of either oil were needed to achieve the same result. After 4 days at 28°C, orange oil at 3500 ppm in either medium markedly inhibited mould growth and aflatoxin production. Higher concn. of orange oil further reduced mould growth and aflatoxin production and also delayed the onset of sporulation. Although aflatoxin was detected in all samples, only 0.2-0.5% of the amount found in controls (without citrus oil) was present when the medium contained 7000 ppm orange oil. The mould grew consistently but poorly on the glass at the liquid-atmosphere interface even when the substrate contained a large amount of citrus oil. AS

90

[Studies on mycotoxins in foods. II. Determination of aflatoxins in soy sauce and sake.]
Naoi, Y.; Kazama, E.; Ogawa, H.; Saito, K.; Eguchi, Y.; Shimura, K.; Tomomatu, T.; Kimura, Y.
Annual Report of Tokyo Metropolitan Research Laboratory of Public Health **23**, 169-173 (1971, publ. 1972) [3 ref. Ja, en] [Dep. of Food Hygiene and Nutr., Tokyo Metropolitan Res. Lab. of Public Health, Tokyo, Japan]

Aflatoxins were determined in soy sauce and sake by a modified AOAC method. No aflatoxins were found. [See FSTA (1973) **5** 2J293 for part I.] AS

91

[Ochratoxin A in coffee.] Ochratoxin A im Kaffee.
Gallaz, L.; Stalder, R.
Chemie Mikrobiologie Technologie der Lebensmittel 4 (5) 147-149 (1976) [9 ref. De, en, fr] [Societe d'Assistance Tech. pour Produits Nestle SA, Lab. Biol., Orbe, Switzerland]

Aspergillus ochraceus, a natural contaminant of green coffee, produced 40 parts/billion of ochratoxin A when grown on coffee under laboratory conditions. During roasting, 80-90% of the ochratoxin was destroyed. AS

92

Aflatoxin production: influence of corn constituents.
Lillehoj, E. B.; Lambrow, M. G.
Abstracts of the Annual Meeting of the American Society for Microbiology **74**, 10 (1974) [En] [N. Regional Res. Lab., USDA, Peoria, Illinois, USA]

Variability of aflatoxin production by strains of Aspergillus parasiticus and Asp. flavus on autoclaved corn as fermentation substrates was determined. After 7 days of static incubation at 25°C on ground whole corn, Asp. parasiticus isolates NRRL 5862 and 5013 (250 µg aflatoxin B_1/g) and Asp. flavus strain NRRL 3357 (150 µg B_1/g) gave the largest toxin yields. Although toxin levels were similar on dry-mill corn germ fraction, production was reduced 20% on corn endosperm and 75% on defatted corn germ. The influence that trace elements have on aflatoxin produced by Asp. flavus growing on autoclaved corn germ fraction was measured. Addition of 5-10 µg Mn, Cu and Cd/g of germ increased aflatoxin yields about 2-fold. A similar increase was observed with 250 µg Zn/g of substrate; lower levels of Zn had no significant effect on toxin elaboration. After 3 days at 25°C, Asp. flavus NRRL 3357 produced 31 µg B_1/g on a germ fraction enriched with 250 µg Zn/g of substrate. Addition of 50-1000 µg Cr or Fe/g of germ had little effect on aflatoxin production. Increasing Cd levels from 10 to 50 µg/g reduced toxin yield by 60%, and extending Cu levels from 250 to 500 µg/g diminished aflatoxin production by 65%. AS

93

Aflatoxin occurrence in white corn under loan, 1971. IV. Mold flora studies.
Hesseltine, C. W.; Bothast, R. J.; Shotwell, O. L.
Abstracts of the Annual Meeting of the American Society for Microbiology **74**, 9 (1974) [En] [N. Regional Res. Lab., USDA, Peoria, Illinois, USA]

An extensive study was made of white corn under government loan as it was delivered in 1972 to the Agricultural Stabilization and Conservation Service at Diehlstadt, Missouri. The corn (450 000 bushels) came from 77 loans and had been stored on farms. From each of 1283 trucks, representative samples of corn were taken and ground for aflatoxin assay; a small portion was used to streak plates of yeast extract agar containing tetracycline. After incubation for 5 days at 28°C, plates were read under a dissecting microscope for common types of moulds with special emphasis on Aspergillus flavus. A rough estimation was made of Asp. flavus colonies/plate. Other moulds recorded were Asp. niger, Asp. fumigatus, Asp. terreus, Asp. glaucus group, Trichoderma, Penicillium, Fusarium, Rhizopus, Mucor, and Absidia. Of the 1283 samples, each representing a truckload of corn, 394 contained aflatoxin, and of these, Asp. flavus was present in all but 6. The moulds most common in the 1283 samples were Penicillium sp. (94%), Fusarium (89%), Asp. flavus (82%), and Asp. niger (71%). No correlation seemed to exist between grade of corn and presence of Asp. flavus. When actual counts of Asp. flavus were made on 3 loans, occurrence of Asp. flavus closely paralleled the aflatoxin content of the corn. [See FSTA (1976) **8** 2M249 for part III.] AS

94

Incidence of aflatoxin in corn and a field method for aflatoxin analysis.
Hunt, W. H.; Semper, R. C.; Liebe, E. B.
Cereal Chemistry 53 (2) 227-232 (1976) [6 ref. En] [Grain Div., USDA, Hyattsville, Maryland

20782, USA]

Surveys were made during the 1972 and 1973 crop yr to determine the incidence of aflatoxin in commercial lots of marketed corn. Incidence refers to the proportion of samples with levels of aflatoxin detectable by the test method used. Samples being officially graded by several field offices were selected for the surveys. The field offices examined the samples under high intensity black light for evidence of bright greenish-yellow fluorescence (BGYF). Samples with kernels exhibiting BGYF were tested for aflatoxin. During 1972, both the CB TLC and Velasco rapid Florisil solumn methods were used to test for aflatoxin. Only the latter test method was used in the 1973 survey. A comparison of the surveys indicates an increase in the incidence of aflatoxin-contaminated samples from <2% of the 1972 crop to >7% of the 1973 crop. However, changes in UV scanning procedures and the relocation of Florisil testing to 3 area analytical offices may account for the observed increased incidence. AS

95

Aflatoxin contamination and its heat stability in Indian cooking oils.

Peers, F. G.; Linsell, C. A.

Tropical Science **17** (4) 229-232 (1975) [11 ref. En] [Tropical Products Inst., 56/62 Grays Inn Road, London WC1X 8LU, UK]

The heat stability of aflatoxins B in cooking oils was investigated by adding 2.5 mg aflatoxin B_1 dissolved in 2 ml dimethyl sulphoxide, to 1 l. of commercially produced corn oil. The mixture was agitated at room temp. for 30 min to uniformly distribute the toxin throughout the oil. The contaminated oil was heated on a hot plate with magnetic stirring in a darkened room. Heating was regulated to maintain the oil temp. constant at various levels for 20 min periods before increasing the temp. further. 2 ml samples of the oil were withdrawn from the mixture at the beginning and end of such temp.-stable periods and assayed for aflatoxin. The experiment was repeated using 100 ml of an Indian peanut oil, naturally contaminated with aflatoxin B_1 at a level of 175 mg/kg. The results obtained were essentially the same as with artificially contaminated corn oil and confirm that little if any destruction of aflatoxin B_1 is likely to occur at normal frying temp. if the cooking is done indoors. VJG

96

An improved semi-quantitative method for the estimation of aflatoxin M_1 in liquid milk.

Patterson, D. S. P.; Roberts, B. A.

Food and Cosmetics Toxicology **13** (5) 541-542 (1975) [7 ref. En] [Cent. Vet. Lab., Weybridge, Surrey, KT15 3NK, UK]

The present modification to the method of Roberts & Allcroft [Food and Cosmetics Toxicology (1968) **6**, 339] eliminates the risk of emulsion formation at the extraction stage, reduces the working time for the analysis and increases its overall sensitivity. 50 ml liquid or reconstituted powdered milk is mixed with 100 ml acetone and then transferred to a dialysis sac prepared from water-washed Visking tubing, which is placed in a jar containing 66% aqueous acetone (500 ml) and all allowed to equilibrate overnight. The diffusate is transferred to a 1 l. separating funnel and the toxin is extracted with chloroform. The combined chloroform extracts are evaporated to near dryness in a rotary evaporator. Evaporation is completed in a stream of N_2. The residue is redissolved in 50-300 ml chloroform, depending on the likely level of aflatoxin M_1 contamination. TLC plates coated with silica gel (about 0.25 mm thick) are used and chromatograms are developed with chloroform-acetone-propan-2-ol (85:10:5 by vol.). The semi-quantitative estimation of aflatoxin M_1 is carried out by visual matching under UV light (365 nm). The smallest quantity of aflatoxin M_1 detectable under these conditions is about 0.5 ng. When the final vol. of extract is 50 µl, the analytical limit of the method is in the region of 0.1 µg/l. milk. This detection limit is currently required for any prospective milk surveys. VJG

97

[Is there a danger of mycotoxins in Hungarian salami? I. Effect of substrate, a_w value and temperature on toxin production in mixed cultures.]

Besteht eine Mykotoxingefahr bei der ungarischem Salami? I. Teil: Einfluss von Substrat, a_w-Wert und Temperatur auf die Toxinbildung bei Mischkulturen.

Incze, K.; Frank, H. K.

Fleischwirtschaft **56** (2) 219-225 (1976) [24 ref. De, en, fr] [Ungarische Forschungsinst. für Fleischwirtschaft Gubacsi ut 6/b, H-1097 Budapest, Hungary]

The formation of aflatoxin (A) and sterigmatocystin (S) during maturing of Hungarian salami was investigated. Mycotoxin producers were grown in single or mixed culture, on Czapek-Dox agar, nutrient agar or minced lean pork, at a_w 0.99, 0.97, 0.94 or 0.90, and at 13°, 20° or 30°C; effects on growth and toxin production are tabulated. The toxin formation was not reduced by mixed culture under conditions optimum for toxigenic strains. Reduced toxin formation under conditions optimum for "mixed salami culture" was attributable to suppression of growth of the toxin-formers by the salami culture, reinforced at low temp. and a_w (20°C, 0.94). Pure cultures grew normally on minced meat at 30°C and a_w 0.99 but produced no S and only 2 out of 8 produced A. Under the conditions normal for maturation of Hungarian salami, i.e. 13°C and a_w 0.94 on minced meat only Aspergillus parasiticus 403 was toxigenic in pure culture (but not in mixed culture); 2 toxigenic strains were found at 20°C, a_w 0.94, and 3 at 13°C, a_w 0.97. No S was formed under any conditions. RM

98

[Effects of additives used in meat processing on growth and toxin formation by Aspergillus flavus.]
[Lecture]
Dinchev, D.
Proceedings of the European Meeting of Meat Research Workers **19** (Part II) 969-975 (1973) [8 ref. Ru, fr, en, de]

Studies were conducted on the aflatoxin-forming characteristics of 2 strains of Aspergillus flavus, cultivated on a rice medium and on cooked sausages containing various additives (NaCl, $NaNO_2$, $NaNO_3$, sodium tripolyphosphate, sucrose). A table of results is given. The likelihood of mould growth in dry sausages is discussed. [See FSTA (1976) 8 9S1589.] AJDW

99

Aflatoxin content and skin removal of Spanish peanuts as affected by treatments with chemicals, water spray, heated air, and liquid nitrogen.
Paulsen, M. R.; Brusewitz, G. H.; Clary, B. L.; Odell, G. V.; Pominski, J.
Journal of Food Science **41** (3) 667-671 (1976) [12 ref. En] [Agric. Eng. Dep., Oklahoma State Univ., Stillwater, Oklahoma 74074, USA]

Unshelled Spanish peanuts contaminated with aflatoxin were shelled and treated with forced heated air, liquid N_2, H_2O_2, HCl, sodium oleate, and water spray. After passing through a whole nut blancher the aflatoxin content and % of blanched (skin removed) and whole kernels were determined. Blanching % were significantly higher for sodium oleate, water spray, liquid N_2 and H_2O_2 than for HCl or heat treatments. The heat treatment produced the highest % of whole kernels. In most tests, the unblanched kernels contained higher levels of aflatoxin than those that blanched fully. The treatments which were most effective in producing low levels of aflatoxin in the blanched kernels were H_2O_2, water spray and HCl. IFT

100

Colonization of almond by Aspergillus flavus.
Phillips, D. J.; Vota, M.; Monticelli, D.; Curtis, C.
Journal of the American Society for Horticultural Science **101** (1) 19-23 (1976) [20 ref. En] [Agric. Res. Service, USDA, PO Box 8143, Fresno, California 93727, USA]

The Aspergillus flavus group was associated with both sound and insect damaged kernels of almond Prunus dulcis (Mill.) D.A. Webb during 1972 and 1973. About 1 of 2000 sound kernels and 1 of 200 insect damaged kernels were colonized. Surface contamination was common on sound and damaged kernels. In orchard plots, spores inoculated on the fruit colonized hulls, shells, and kernels of maturing almonds. Aflatoxins were detected in harvested kernels and hulls. Almond fruits were susceptible to colonization from the time of hull-split, when rapid drying of the fruit began, until after harvest when moisture of the kernel dropped below about 5% based on the fresh wt. of the kernel. Infestations by the navel orangeworm, Paramyelois transitella (Walker), increased colonization of the kernels by A. flavus from experimental plots. AS

101

Development of aflatoxin in 'Stuart' pecans as affected by shell integrity.
Schroeder, H. W.; Storey, J. B.
HortScience **11** (1) 53-54 (1976) [4 ref. En] [Agric. Res. Service, USDA, College Station, Texas 77840, USA]

The intact shell of pecans Carya illinoensis (Wang.) K. Koch cultivar Stuart provided a protective barrier to invasion of the kernels by Aspergillus flavus and to the development of kernel discoloration. After 28 days exposure to high humidity on A. flavus infested soil 36% of the surface area of pecan kernels from sound inshell nuts was discolored compared to 100% of the surface area of kernels from pecans with cracked shells. Aflatoxins were detected after 8 days in kernels (not obviously discolored or mouldy) from cracker inshell nuts at a concn. of 3500 parts/billion and reached a max. concn. of 1 000 000 parts/billion after 21 days. Aflatoxins (840 parts/billion) were detected in pecans with sound shells after only one of 5 exposure periods (21 days) suggesting that one nut may have had a defective shell or may have been previously contaminated. The mycotoxin, zearalenone, was extracted from kernels with sound shells after 28 days. AS

102

[Aflatoxins in cereals.]
Deac, C.; Gabor, M.; Puscariu, F.; Kosztin, P.
Igiena **25** (1) 35-38 (1976) [16 ref. Ro]

During 1972-1973, a total of 180 samples of cereals (corn-on-the-cob, maize, wheat, oats) from different climatic areas (mild or harsh) was analysed by TLC for contents of aflatoxins. In the cereals from the mild climatic areas, 11 (12.5%) gave a positive finding, vs. 2 (<2%) in those from the harsh climatic areas. Aspergillus and Penicillium spp. predominated in the mild areas, while Fusarium was found in the harsh areas. HBr

103

[Identification and semiquantitative determination of ochratoxins A and B, sterigmatocystin and aflatoxin B_1.]
Lemieszek-Chodorowska, K.
Roczniki Panstwowego Zakladu Higieny **27** (2) 153-160 (1976) [20 ref. Pl, ru, en] [Panstwowy Zaklad Higieny, Warsaw, Poland]

One-dimensional TLC was used for identification and semiquantitative detn. of the title mycotoxins, isolated from cereals (wheat, rye, rice). The extracts were purified using chromatographic columns filled with Celite (ochratoxins) or silical gel (aflatoxin B_1 and sterigmatocystin). The purified extracts were developed on the same chromatogram with a single colvent system, benzene:methanol:acetic acid (90:5:5). Fluorescence of the mycotoxins was evaluated at a wavelength of 366 mm; sterigmatocystin was visualized by spraying with an ethanolic solution of $AlCl_3$, and an ethanol-water solution of $NaHCO_3$ was used to increase the fluorescence of the

ochratoxins. The R_f values obtained were: aflatoxin B_1, 0.25-0.28; ochratoxin B, 0.30-0.33; ochratoxin A, 0.40-0.43; sterigmatocystin, 0.56-0.59. The lowest amounts determined on chromatograms were (µg): aflatoxin B_1, 0.001; ochratoxins A and B, 0.0025; sterigmatocystin, 0.005. AS

104

[Confirmation of aflatoxin formation by a strain of Aspergillus flavus isolated from Korean rice.]
Lee, K. Y.; Choi, E. H.; Lee, S. R.
Korean Biochemical Journal **8** (1) 1-9 (1975) [21 ref. Ko, en] [Agric. Biochem. Lab., Korea Atomic Energy Res. Inst., Seoul, Korea]

In order to confirm the production of aflatoxin by Aspergillus flavus var. columnaris, isolated from spoilage rice in Korea, aflatoxin B_1 was purified in crystalline form from inoculated rice and identified by TLC, mp, derivative formation, UV and IR spectra and growth inhibition of Bacillus megaterium. The level of production of aflatoxin by the strain was about 7.8 µg/g rice. KoSFoST

105

Aflatoxin M_1. Occurrence in stored and freshly harvested corn.
Shotwell, O. L.; Goulden, M. L.; Hesseltine, C. W.
Journal of Agricultural and Food Chemistry **24** (3) 683-684 (1976) [14 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

Aflatoxin M_1 (50 ppb (parts/billion)) has been found in a ground blended sample of stored corn collected in Illinois that contained 1600 ppb of aflatoxin B_1. Aflatoxin M_1 was also detected in 7 samples of freshly harvested corn from the southeast USA containing 210-3200 ppb of B_1. Individual fluorescing corn kernels and pieces were collected from 4 lots of corn for M_1 analysis: white stored corn, freshly harvested yellow corn, yellow stored corn, and acid-treated yellow stored corn. Aflatoxin M_1 could be detected in kernels and pieces that contained >1000 ppb of B_1, and its identity was confirmed by the acetate and hemiacetal derivatives. AS

106

[Investigations of aflatoxins B_1, B_2, G_1, G_2, and M_1 in milk and milk products.] Zur Untersuchung von Milch und Milchprodukten auf die Aflatoxine B_1, B_2, G_1, G_2 und M_1.
Kiermeier, F.; Weiss, G.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **160** (4) 337-344 (1976) [3 ref. De, en] [Chem.-physikalisches Inst. Süddeutsche Versuchs- und Forschungsanstalt für Milchwirtschaft, D-8050 Weihenstephan, Federal Republic of Germany]

The method proposed by the Bundesgesundheitsamt for the estimation of aflatoxins B_1, B_2, G_1 and G_2 in milk, based on purification of a chloroform extract of the toxin by column chromatography followed by TLC and densimetric estimation, can be modified to include estimation of aflatoxin M_1 by minor changes in the vol. of extract and eluting media used. The modified method, described in full, is applicable to milk, dried milk, butter, cheese, quarg, cream and yoghurt. Reproducibility of results is not high however, so replication is required for reasonably accurate detn. In 9 replicate detn. of some 6 mg/kg of each of the 5 aflatoxins in fruit yoghurt, recoveries of 99.8 ± 13.7% for B_1 and 94.3 ± 21.6% for M_1 were obtained. GTP

107

[The significance of mycotoxins in the food industry.]
Szigeti, G.
Elelmezesi Ipar **29** (3) 87-89 (1975) [Hu, en, de, ru] [Allategeszsegügyi Intezet Miskolc, Doczyu 6, Hungary]

The main mycotoxins of significance in food products are discussed, with reference to species forming these toxins, foods in which they are found, conditions for their formation, toxic effects, and LD_{50} values. AJDW

108

[Protection from noxious substances in food as a duty of food control.] Der Schutz vor Schadstoffen in der Nahrung als Aufgabe der Lebensmittelüberwachung.
Sperlich, H.
Ernährungs-Umschau **22** (10) B37-B39; (11) B41-B43 (1975) [36 ref. De] [7000 Stuttgart 1, Postfach 1219, Federal Republic of Germany]

Possible sources of contamination of food are considered with particular reference to the occurrence of Pb, Hg, radioactive substances, mycotoxins and carcinogenic hydrocarbons on materials destined for human consumption. The practice by which bulk raw food materials are transported in containers previously used for transport of non-edible materials is strongly condemned, and an example, contamination of bakery flour with lime, is quoted. Atmospheric Pb contamination by petrol fumes is considered in the light of regulations reducing the permitted level in petrol from 0.6 to 0.4 g/l. The fallacy involved in the assumption that materials of natural origin are harmless is emphasized, with reference to toxins produced by microorganisms, e.g. botulinum toxin and aflatoxin. Introduction of legislation limiting the permissible content of aflatoxin in materials for human consumption to a value of 10 µg/kg is expected. The intake of noxious substances in small amounts, e.g. carcinogens and potential carcinogens, must be viewed in the context of the total exposure situation, since such items cannot be completely excluded from the diet. BDH

109

Aflatoxin production by a variant of Aspergillus oryzae (NRRL strain 1988) on cowpeas (Vigna sinensis).
El-Hag, N.; Morse, R. E.

Science, USA **192** (4246) 1345-1346 (1976) [11 ref. En] [Dep. of Food Sci., Cook Coll., Rutgers-State Univ. of New Jersey, New Brunswick, New Jersey 08903, USA]

Aflatoxins B_1, B_2, G_1 and G_2 are produced when a variant of Asp. oryzae (NRRL strain 1988) is grown on cowpeas or rice. The present study indicates that a strain of Asp. oryzae approved for use in food processing (e.g. in fermentation or for enzyme production) is variable and the resulting variant, unlike the parent strain, has a propensity to produce aflatoxin. AS

110

Electrophilic and ultimate carcinogenic derivatives of aflatoxin B_1.
Swenson, D. H.
Dissertation Abstracts International, B **36** (9) 4374-4375: Order No. 75-28027 (1976) [En] [Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

111

Derivatization procedure for identification of aflatoxin M_1 on a thin layer chromatogram.
Trucksess, M. W.
Journal of the Association of Official Analytical Chemists **59** (3) 722-723 (1976) [7 ref. En] [Div. of Food Tech., FDA, Washington, DC 20204, USA]

A commodity extract containing presumptive aflatoxin M_1 is placed on an origin spot of a TLC plate and over-spotted with trifluoroacetic acid. The mixture is held in the dark 30 min at ambient temp. and then 30 min at 55°C. The plate is developed with $CHCl_3$-acetone-2-propanol (85 + 10 + 7). The R_f values of reacted and unreacted aflatoxin M_1 are compared with authentic M_1 similarly treated for identification. The lowest concn. that has been identified is 0.1 µg/kg. AS

112

Mycotoxins; toxicity, carcinogenicity, and the influence of various nutritional conditions.
[Review]
Newberne, P. M.
Environmental Health Perspectives No. 9, 1-32 (1974) [165 ref. En] [Dep. of Nutr. & Food Sci., Massachusetts Inst. of Tech., Cambridge, Massachusetts 02193, USA]

This review covers the literature on mycotoxicoses but centres on those about which most is known, particularly diseases associated with metabolites elaborated by some strains of Aspergillus, Penicillium, Fusarium, Stachybotrys and Claviceps. Aflatoxins (toxic metabolites of Asp. flavus) are ubiquitous and their ingestion is associated with endemic liver disease. Ergotism, caused by toxins of C. purpurea, is considered in detail. Alimentary toxic aleukia, a disease largely of Russian populations, has been linked with toxic products of Fusarium spp. Stachybotryotoxicosis and diseases associated with toxins of Penicillium spp., including acute and chronic hepatotoxicity, are discussed, and factors which influence susceptibility to mycotoxins and the hazards they present to man are also reviewed. AS

113

[Studies on the compounds produced by moulds. IX. Fluorescent compounds produced by Aspergillus flavus Link ex Fr. (WF-3-8) and Asp. flavus Link ex Fr. (68-SA-R-7).]
Sasaki, M.; Oshita, K.; Yokotsuka, T.
Journal of the Agricultural Chemical Society of Japan [Nihon Nogei Kagakkai-shi] **49** (10) 553-555 (1975) [14 ref. Ja, en] [Cent. Res. Lab., Kikkoman Shoyu Co. Ltd., Noda-shi, Chiba-ken, Japan]

(i) Asp. flavus Link ex Fr. (WF-3-8) and (ii) Asp. flavus Link ex Fr (68-SA-R-7), isolated from imported wheat flour and rural home-made miso, were reported to produce aflatoxin. Re-examination of the metabolites by TLC and UV and fluorescence spectroscopy indicated that (i) produces B group aflatoxins, but that (ii) produces no aflatoxin of any group. [From En summ.] [See Journal of the Agricultural Chemical Society of Japan (1974) **48** (10) 569-572 for part VIII.] JRR

114

Determination of aflatoxins in groundnut meals by high performance liquid chromatography.
Kmieciak, S.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **160** (3) 321-324 (1976) [8 ref. En, de] [Cent. Chem. Lab. "Polcargo", Indyjska 13, Gdynia, Poland]

A method for determination of aflatoxins in groundnut meals by high performance liquid chromatography (HPLC) was investigated. After extraction and purification according to the AOAC 'CB' method, an extract is injected on a Corasil II column and eluted by n-hexane/chloroform/ethanol (50:49.7:0.3). Detection is performed with an UV detector. The method determines aflatoxins B_1, B_2, G_1 and G_2. The detection limit for aflatoxin B_1 is 50 parts/billion using a 254-nm UV detector, or less with more effective detectors (absorption at 350-360 nm). AS

115

Aflatoxin inactivation: treatment of peanut meal with formaldehyde and calcium hydroxide.
Codifer, L. P., Jr.; Mann, G. E.; Dollear, F. G.
Journal of the American Oil Chemists' Society **53** (5) 204-206 (1976) [14 ref. En] [S. Regional Res. Cent., USDA, New Orleans, Louisiana 70179, USA]

A peanut meal contaminated with approx. 600 parts/billion aflatoxins was treated with formaldehyde alone and in combination with calcium hydroxide in a bench-scale reactor, operated both sealed and at atmospheric pressure. In general, TLC assays revealed that addition of

calcium hydroxide to formaldehyde caused greater inactivation of the toxins than did formaldehyde alone. With the reactor sealed and 25% moisture in the meal, treatments for 1 h with 0.5% and 1.0% formaldehyde plus 2.0% calcium hydroxide yielded products having 3 and 1 part/billion, respectively, whereas under reflux at atmospheric pressure with 20% meal moisture 1 h treatment with 1.0% calcium hydroxide yielded a product with 5 parts/billion aflatoxins.   AS

116

[Occurrence of aflatoxins in some pickled foods.]
Subrahmanyam, P.; Rao, A. S.
Indian Journal Microbiology **13** (3) 157-159 (1973) [4 ref. En] [Microbiol. Lab., Dep. of Bot., S. V. Univ., Tirupati-2, Andhra Pradesh, India]

Mango, lemon and emblic myrobolan (Phyllanthus emblica) pickled in a mixture of salt, chilli powder, turmeric powder and gingely oil and stored in bottles or polyethylene (PE) bags were examined for microorganisms and aflatoxins. Aflatoxins were extracted by a method based on that of Y in et al. [FSTA (1971) **3** 8N326], assayed by TLC, and their presence confirmed by bioassay using Bacillus megaterium and B. brevis. Aspergillus flavus, Rhizopus spp., Mucor sp. and 2 unidentified bacteria were isolated. No Asp. flavus and no aflatoxin were found in 8 samples of bottled pickled lemons (pH 3.6-3.8) or in 8 samples of bottled pickled emblic myrabolan (pH 3.7-4.0). Of 40 samples of pickled lemons in PE bags (pH 3.9-4.2), 25 contained Asp. flavus and 19 aflatoxins (range 45-425 µg/kg). Of 8 samples of bottled pickled mango (pH 4.0-4.1), 4 contained Asp. flavus and 4 aflatoxins (range 12-105 µg/kg). Of 40 samples of pickled mango in PE bags (pH 4.0-4.2), 32 contained Asp. flavus and 26 aflatoxins (range 120-612 µg/kg). Results indicated that PE bags are not suitable for the storage of pickled foods.   JA

117

Aflatoxin occurrence on raw and cooked York soybeans inoculated with three Aspergillus isolates.
Sherertz, P. C.; Eadie, T.; Young, J. W.; Llewellyn, G. C.
Journal of the Association of Official Analytical Chemists **59** (3) 662-665 (1976) [17 ref. En] [Dep. of Biol., Virginia Commonwealth Univ., Richmond, Virginia 23284, USA]

Raw and cooked soybean media were inoculated in separate experiments with Aspergillus flavus NRRL 3251, A. flavus ATCC 15548, and A. parasiticus NRRL 2999 isolates. The total quantity of aflatoxins produced and the % distribution of aflatoxins B_1, B_2, G_1, and G_2 varied with the state of the medium (raw or cooked) and with the fungal isolate used. Cooked soybean medium supported higher aflatoxin production by A. flavus NRRL 3251 and A. parasiticus NRRL 2999 than did raw medium. Larger quantities of aflatoxins B_1, B_2, G_1 and G_2 were produced by A. flavus ATCC 15548 on raw soybean medium than were produced by any of the isolates on cooked medium. Application of these data is discussed briefly in relation to possible use of soybean media as a source of aflatoxin production.   AS

118

Mycotoxins in foodstuffs. VI. Formation of sterigmatocystin in bread by Aspergillus versicolor.
Reiss, J.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **160** (3) 313-319 (1976) [44 ref. En, de] [Mikrobiol. Lab., Grahamhaus Studt KG, D-6550 Bad Kreuznach, Federal Republic of Germany]

Various sliced loaves (whole wheat bread, whole rye bread with shredded wheat, whole rye bread, whole wheat bread with wheat germs, whole wheat bread with linseed), ranging in acidity (Säuregrad) from 4.0 to 9.8, were packaged in cellulose, inoculated with spores of one of 2 strains of Asp. versicolor and incubated at 4-35°C. Fungal growth and sterigmatocystin production were determined at 24 h intervals. Both strains grew well on whole wheat bread, bread with linseed and bread with wheat germs but not on bread with shredded wheat or whole rye bread. When the acidity of the 2 latter breads was decreased from 9.8 to 4.0-5.7, growth improved. Optimal temp. for growth was 20-30°C and for toxin production 20°C. Sterigmatocystin was produced on all breads except whole rye bread. Max. yields (0.1-0.4 µg/g) were produced on bread with shredded wheat and bread with wheat germs. [See FSTA (1976) **8** 4M492 for part V.]   JA

119

[Assessment of infection of grain by moulds from the content of green-fluorescent substances.]
L'vova, L. S.; Sosedov, N. I.; Shatilova, T. I.
Prikladnaya Biokhimiya i Mikrobiologiya **12** (3) 442-448 (1976) [16 ref. Ru, en] [All-Union Res. Inst. of Grain & Grain Products, USSR]

It was shown that the level of grain infection by moulds can be assessed from the green-fluorescent substances accumulating in grain (wheat). A direct linear correlation between the content of green-fluorescent substances, the number of mould spores and the accumulation of aflatoxins (by toxigenic strains) was established.   AS

120

Field accumulation of aflatoxin in cottonseed as influenced by irrigation termination dates and pink bollworm infestation.
Russell, T. E.; Watson, T. F.; Ryan, G. F.
Applied and Environmental Microbiology **31** (5) 711-713 (1976) [10 ref. En] [Dep. of Plant Path., Univ. of Arizona, Tuscon, Arizona 85721, USA]

Aflatoxin accumulation in Deltapine 16 cottonseed, grown in Yuma, Arizona, in a 3-yr study, was significantly influenced by the timing of irrigation terminations and by level of pink bollworm infestations. In 1971 and 1972,

termination of irrigations by early Aug. resulted in significantly less aflatoxin than in plots where 2 additional irrigations were applied. Significantly less aflatoxin also was found in the 1971 and 1973 plots where low levels of pink bollworm infestations were maintained. AS

121

A chemical assay method for the determination of aflatoxin residues in animal tissues.
Jemmali, M.; Murthy, T. R. K.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **161** (1) 13-17 (1976) [20 ref. En] [INRA, Sta. de Biochimie et Physicochimie des Cereales, Service des Mycotoxines, 16 Rue Nicolas Fortin, F-75013 Paris, France]

The method consists of extraction of aflatoxins from the sample with methanol, treatment of the residue with a 4:1 mixture of dimethoxymethane:methanol to further precipitate proteins, evaporation of the dimethoxymethane followed by liquid-liquid defatting with hexane and heating of the methanol-water mixture before transferring the aflatoxins into chloroform. Chloroform extracts are further purified by column chromatography using silica gel-acidic alumina-anhydrous sodium sulphate. The final step involves determination of the aflatoxins by TLC-fluorodensitometry. The method was applied to various tissues of swine which had been fed aflatoxin-contaminated peanut meal and the results were compared with those obtained by the method of Brown et al. [FSTA (1974) **6** 4S424]. The new method gave higher values and detected aflatoxins B_1, B_2 and M in tissues showing negative results by the Brown et al. procedure. JA

122

Aflatoxin. Determination in peanuts and peanut products.
Nordic Committee on Food Analysis
Nordic Standard No. 90, 3pp. (1975) [En, Da]

The aflatoxin components (B_1, B_2, G_1 and G_2) are extracted from the ground peanut sample by water and chloroform. After filtration the extract is purified by column chromatography using hexane and anhydrous ether, and the components are eluted with methanol-chloroform (3:97 v/v). Separation and quantitation are by TLC, involving use of internal standards. Detection limit is in the range 1-5 μg/kg, with a coeff. of variation of 20-30% by visual quantitation, or approx. 5% using a densitometric technique. AL

123

Formation of a derivative of aflatoxin B_1 on a Sephadex column with a 1% aqueous solution of methanol.
Kmieciak, S.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **161** (3) 239-242 (1976) [6 ref. En, de] ["Polcargo" Cent. Chem. Lab., Indyjska 13, 81-969 Gdynia, Poland]

A partial separation of aflatoxins B_1 and B_2 on a Sephadex column with a 1% aqueous solution of methanol as mobile phase was achieved. The chromatographic system is, however, not neutral for aflatoxin B_1. During elution a derivative (probably aflatoxin B_1 hemiacetal) is produced. The derivative forms blue fluorescent spots on Adsorbosil-1 plates with R_f 0.15 when developed in chloroform/acetone (90 + 10). AS

124

Acute toxicity of aflatoxin B_1 for baboons. [Letter]
Peers, F. G.; Linsell, C. A.
Food and Cosmetics Toxicology **14** (3) 227-228 (1976) [9 ref. En] [Tropical Products Inst., 56-62 Grays Inn Rd, London WC1X 8LU, UK]

3 baboons of approx. 5 kg body wt. were anaesthetized and then dosed by gastric intubation with the calculated amount of aflatoxin B_1 dissolved in ≤2.5 ml dimethylsulphoxide at each of 5 dosage levels. Surviving animals were biopsied 7 days, 1 month and 3 months after administration of the toxin. The single LD_{50} for baboons in this experiment, calculated by the Weil procedure, was 2.02 mg/kg with a 95% confidence interval of 1.41-2.89 mg/kg. The result of this study with pure aflatoxin B_1 confirms the earlier study with mixed aflatoxins and suggests that the toxicities of the 4 major aflatoxins in baboons may be similar to the ratios reported for ducklings. VJG

125

Possible effects of aflatoxin consumption by man.
Cooper, P.
Food and Cosmetics Toxicology **14** (2) 151-152 (1976) [16 ref. En] [British Ind. Biol. Res. Ass., Woodmansterne Rd, Carshalton, Surrey, UK]

Consideration is given to the possible association of aflatoxin ingestion with Reye's syndrome, and with liver cancer in Africa. VJG

126

[Microbiological aspects of food preservation.]
Mikrobiologische Aspekte der Haltbarmachung von Lebensmitteln.
Brandl, E.
L und E **28** (11) 267-270 (1975) [De, en] [Inst. für Milchhygiene & Milchtech., Tierärztliche Hochschule, Vienna, Austria]

The following items are discussed in an abridged version of a lecture: action of heat treatment on microorganisms in milk; preservation by technological alteration of foods; the positive role of microorganisms in the production of fermented foods; and foods as carriers of pathogenic microorganisms and toxinogenic moulds. AS

127

[Formation of aflatoxins on stored grain contaminated with Aspergillus flavus.]
Lee, K.-Y.; Kim, Y.-B.; Lee, S.-R.
Korean Journal of Food Science and Technology **7** (1) 7-10 (1975) [18 ref. Ko, en] [Agric. Biochem. Lab., Korea Atomic Energy Res. Inst., Seoul, S. Korea]

Rice was inoculated with Asp. flavus var. columnaris and stored for 0-100 days at RH of 53.3-100% at 30°C. Aflatoxins formation and mould growth were measured. Results are graphically presented. No aflatoxin was detected up to 75.4% RH; max. aflatoxin (25.9 parts/billion aflatoxin B_1) was detected at 92.5% RH. It was found that the presence of other microorganisms caused a decrease in the level of aflatoxin. Other grains were also tested for aflatoxins accumulation and results showed that millet was the most susceptible, at 1940 parts/billion aflatoxin B_1 and 122.7 parts/billion B_2. Soybeans were the least susceptible, at 25.9 parts/billion B_1 and no detectable B_2. [From En summ.] CRI

128

[Mycotoxin production by fungi isolated from wheat and barley grains.]
Ichinoe, M.; Takatori, K.; Tanaka, S.; Kumata, H.; Suzuki, T.; Kurata, H.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] 16 (6) 381-390 (1975) [36 ref. Ja, en] [Nat. Inst. of Hygienic Sci., Kamiyoga, Setagaya, Tokyo, Japan]

Aspergillus, Penicillium and Alternaria were found in 70-80% of samples of wheat and barley grain; Cladosporium, Rhizopus and Mucor were also commonly isolated. Aflatoxin, sterigmatocystin, ochratoxin, penicillic acid and patulin were produced by some strains. TM

129

A note on aflatoxin production by some Indian strains of Aspergillus flavus.
Subrahmanyam, P.; Rao, A. S.
Indian Journal Microbiology 14 (1) 31-34 (1974) [9 ref. En] [Dep. of Bot., S. V. Univ., Tirupati-517502, Andhra Pradesh, India]

63 groundnut samples obtained from 7 Indian states in 1971-1972 were examined for Asp. flavus and the isolates obtained were studied for aflatoxin formation. 4 Asp. flavus isolates varying qualitatively and quantitatively in aflatoxin production were tested for their ability to produce aflatoxins on healthy mature oilseeds: castor, gingelly (Sesamum indicum), groundnut, safflower, sunflower, copra and niger seed (Guizotia abyssinica). Of 240 Asp. flavus isolates obtained from the 63 groundnut samples, only 72 produced aflatoxins. Of these, 16 produced aflatoxin B_1 only, 8 produced B_1 and G_1 and 48 produced B_1, G_1, B_2 and G_2. In oilseed studies, aflatoxin production was greatest on groundnut, copra and castor and progressively lower on sunflower, safflower, niger seed and gingelly. JA

130

[Mycotoxins in milk and milk products.] Über toxische Schimmelpilzmetaboliten in Milch und Milchprodukten. [Lecture]
Brandl, E.
Wiener Tierärztliche Monatsschrift 63 (5) 166-171 (1976) [20 ref. De, en] [Inst. für Milchhygiene & Milchtech., Veterinärmed. Univ., Vienna, Austria]

131

[New extraction method for quantitative determination of aflatoxin M in milk.]
Fonseca, H.; Nery, H. del
Revista Brasileira de Tecnologia 4 (3/4) 213-215 (1973) [8 ref. Pt, en] [Dep. de Tecnologia Rural, Caixa Postal 9, Piracicaba, SP, Brazil]

A new method for extraction of aflatoxin 'M' from milk is proposed. The new method avoids the freeze-drying step; this simplifies the test and greatly reduces the working time, enabling any modestly equipped laboratory to apply it. Extraction is made by adding to the liquid milk an equal vol. of methanol, followed by chloroform and stirring vigorously. It is immediately centrifuged (discarding the upper phase) and filtered over Celite in a Büchner funnel. The extract obtained is concentrated and further purified by partition with petroleum ether, evaporated to dryness, redissolved with chloroform and chromatographed on Silicagel-G thin-layer plates. The authors conclude that the method can be used in routine analysis, for the results obtained were practically the same as those obtained by a modified Croft method. AS

COPYRIGHT REGULATIONS

Form of Declaration and Undertaking

To the Editor, International Food Information Service, Shinfield,
Reading RG2 9AT, Berkshire, England.

1. I ....

   of ....

   Hereby request you to make and supply to me a

   Photocopy of the article covered by

   Journal name ....

   Volume ...... Part ...... Pages .... Year ....

   which I require for the purposes of research or private study.

2. I have not previously been supplied with a copy of the said article/part of the said work by any librarian.

3. I undertake that if a copy is supplied to me in compliance with the request made above, I will not use it except for the purposes of research or private study.

   Signature* .... Date ....

   (*Note: This must be the personal signature of the person making the request. A stamped or typewritten signature or the signature of an agent is NOT sufficient.)

4. Send this form and remittance (10p per page) to the above address. (Minimum charge 50p)

(Note: Additional forms are available on request)

FOOD ANNOTATED BIBLIOGRAPHIES (FABS).

AB		Vol. 1 - 7 incl. Price	Vol.8 1976 Price	Vol. 9 1977 updated monthly Price
1	Application of Reverse Osmosis to Food Processing	☐ £8.00	☐ £3.00	☐ £6.00
2	New Sources of Food Protein	☐ £15.00	☐ £6.00	☐ £13.00
3	Natural and Synthetic Sweeteners	☐ £9.00	☐ £3.00	☐ £7.00
4	Techniques for Analysis of Flavour Volatiles	☐ £13.00	☐ £3.00	☐ £8.00
5	Microwaves in Food Processing	☐ £8.00	☐ £3.00	☐ £6.00
6	Texture Analysis of Foods	☐ £18.00	☐ £4.00	☐ £9.00
7	Synthetic Dairy Products	☐ £8.00	☐ £3.00	☐ £6.00
8	Acidulants in Foods	☐ £11.00	☐ £3.00	☐ £6.00
9	Agglomeration of Powders	☐ £8.00	☐ £3.00	☐ £6.00
0	Aseptic Packaging	☐ £8.00	☐ £3.00	☐ £7.00
1	EEC Regulations	☐ £8.00	☐ £3.00	☐ £6.00
2	Toxicology of Food Additives	☐ £8.00	☐ £3.00	☐ £7.00
3	Deep Fat Frying	☐ £11.00	☐ £3.00	☐ £8.00
4	Viscosity of Foods	☐ £11.00	☐ £3.00	☐ £7.00
5	Taste Panels in Food Science	☐ £8.00	☐ £3.00	☐ £8.00
6	Taints in Foods	☐ £8.00	☐ £3.00	☐ £7.00
7	Microbial Toxins in Foods	☐ £8.00	☐ £3.00	☐ £8.00
8	Smoked Food Products	☐ £9.00	☐ £3.00	☐ £6.00
9	Disposal of Waste Food Products	☐ £12.00	☐ £5.00	☐ £9.00
20	Use of Glucose in Food Products	☐ £8.00	☐ £3.00	☐ £6.00
21	Emulsifiers in Foods	☐ £9.00	☐ £3.00	☐ £7.00
22	Stabilizers in Foods	☐ £9.00	☐ £3.00	☐ £7.00
3	Staling and Antistaling Additives	☐ £8.00	☐ £3.00	☐ £6.00
4	Catering Industry	☐ £8.00	☐ £3.00	☐ £6.00
5	Antioxidants	☐ £9.00	☐ £3.00	☐ £7.00
6	Nitrosamines	☐ £8.00	☐ £3.00	☐ £6.00
7	Content and Analysis of Mercury in Foods	☐ £6.00	☐ £3.00	☐ £7.00
8	Content and Analysis of Lead in Foods	☐ £7.00	☐ £3.00	☐ £6.00
9	Heatable Packs	☐ £6.00	☐ £3.00	☐ £6.00
0	Sulphur Dioxide in Food Products	☐ £8.00	☐ £3.00	☐ £6.00
1	Lactic Acid Bacteria in Beverages and Food	☐ £11.00	☐ £3.00	☐ £8.00
2	Colorants	☐ £9.00	☐ £3.00	☐ £6.00
3	Browning of Foods	☐ £8.00	☐ £3.00	☐ £6.00
4	Aflatoxins	☐ £7.00	☐ £3.00	☐ £7.00
5	Antibiotic Properties and Residues in Food excluding Nisin	☐ £8.00	☐ £3.00	☐ £6.00
6	Nisin	☐ £6.00	☐ £3.00	☐ £6.00
7	Cadmium in Foods	☐ £6.00	☐ £3.00	☐ £6.00
8	Coffee	☐ £10.00	☐ £3.00	☐ £7.00
9	Sorbic Acid	☐ £7.00	☐ £3.00	☐ £6.00
0	Arsenic in Foods	☐ £6.00	☐ £3.00	☐ £6.00
1	Ascorbic Acid	☐ £5.00	☐ £3.00	☐ £8.00
2	Thickeners and Gelling Agents	☐ £4.00	☐ £3.00	☐ £6.00
3	Pseudomonadaceae and Food Processing	☐ £5.00	☐ £3.00	☐ £6.00
4	Spores in Food	☐ £3.00	☐ £3.00	☐ £7.00
5	Breadmaking	☐ £9.00	☐ £3.00	☐ £6.00
6	Bread Properties	☐ £8.00	☐ £3.00	☐ £6.00
7	Food Science and Technology Books	☐ £11.00	☐ £6.00	☐ £12.00
8	Nitrates and Nitrites in Meat Products	☐ *£4.00	☐ £3.00	☐ £7.00
9	Eggs & Poultry Meat	☐ *£8.00	☐ £6.00	☐ £10.00
0	Mycotoxins in Foods (Excluding Aflatoxins & Microbial Toxins)	☐ £4.00	☐ £3.00	☐ £6.00
1	Meat Canning	☐ *£4.00	☐ £3.00	☐ £7.00

Prices include postage by surface mail. For airmail rates, please apply to the address below. * Vol. 6 - 7 only available

To order, or obtain further information, mark the item required, add your name and address and send cash, cheque or postal order to: –

International Food Information Service (IFIS)
Lane End House,
Shinfield, Reading, RG2 9BB,
England.

NAME ....

ADDRESS ....

INTERNATIONAL FOOD INFORMATION SERVICE

ifis

FAB 34

AFLATOXINS

SELECTED FROM VOLUME 9
FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

under the direction of

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks; Gesellschaft fur Information und Dokumentation, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen.

INTRODUCTION

Food Annotated Bibliographies (FABs) are collections of abstracts on specific topics in food science and technology. The topics are chosen by the staff of the International Food Information Service as being of particular interest or importance. The topics normally interest individual workers, who may not require the full information provided in Food Science and Technology Abstracts, from which the abstracts for FABs are taken. The size and the cost of the FABs are controlled as much as possible with the interests of individual workers in mind.

Titles of the FABs now available are given on the back cover of this booklet. New titles are being added at the rate of about 10 per year. For up-to-date lists of FABs or suggestions for new topics please write to the address given overleaf. New subjects are searched for at least the five most recent volumes of Food Science and Technology Abstracts. Thereafter each FAB is updated monthly. Copies of each months abstracts on any topic may be obtained as indicated on the back cover of this publication. At the end of each volume of up-dating, the abstracts are merged and made available as a separate supplement to the original FAB.

Some of the larger FABs have been divided into sections to facilitate use. Abstracts are not printed in more than one section. The larger FABs also have subject indexes provided.

Copies of all original articles referred to in the abstracts may be bought (or occasionally borrowed) from the International Food Information Service. A form for ordering these is provided at the end of this FAB.

Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journa patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES
ASSISTANT EDITOR

1

Mycotoxins and the other fungal related food problems. [Conference proceedings]
Rodricks, J. V. (**United States of America,** American Chemical Society, Division of Agricultural & Food Chemistry) (Editor)
Advances in Chemistry Series **149**, xi + 409pp. ISBN 0-8412-0222-2 (1976) [many ref. En]
Washington, DC, USA

Full version are given of the 18 papers presented at this symposium, sponsored by the Division of Agricultural and Food Chemistry at the 168th Meeting of the American Chemical Society in Atlanta City, New Jersey on 11-13 Sept. 1974. Abstracts of 8 papers have already been covered by FSTA: Conditions leading to mycotoxin contamination of foods and feeds, by C. W. Hesseltine (pp. 1-22, 33 ref.; FSTA (1975) **7** 1C16); Occurrence of mycotoxins in foods and feeds, by L. Stoloff (pp. 23-50, 152 ref.; FSTA (1975) **7** 1C17); The role of aflatoxin in human disease, by R. C. Shank (pp. 51-57, 22 ref.; FSTA (1975) **7** 1C18); Chemical methods investigated for detoxifying aflatoxins in foods and feeds, by A. C. Beckwith, R. F. Vesonder & A. Ciegler (pp. 58-67, 37 ref.; FSTA (1975) **7** 1C19); Aspergillus toxins other than aflatoxins, by R. J. Cole (pp. 68-89, 96 ref.; FSTA (1975) **7** 1C22); Patulin and penicillic acid, by D. M. Wilson (pp. 90-109, 163 ref.; FSTA (1975) **7** 1C23); Stress metabolites of white potatoes, by G. E. Wood (pp. 369-386, 87 ref.; FSTA (1975) **7** 1J47); and Toxic furanosesquiterpenoids from mold-damaged sweet potatoes (Ipomoea batatas), by L. T. Burka & B. J. Wilson (pp. 387-399, 48 ref.; FSTA (1975) **7** 1J49). Other papers presented included: Chemical and biochemical studies of the trichothecene mycotoxins, by R. J. Bamburg (pp. 144-162, 66 ref.); [continued in following abstr.]. AL

2

Mycotoxins and other fungal related food problems. [Conference proceedings]
Rodricks, J. V. (**United States of America,** American Chemical Society, Division of Agricultural & Food Chemistry) (Editor)
Advances in Chemistry Series **149**, xi + 409pp. ISBN 0-8412-0222-2 (1976) [many ref. En]
Washington, DC, USA

[Continued from preceding abstr.] Zearalenone and related compounds, by S. V. Pathre & C. J. Mirocha (pp. 178-227, 85 ref.); The chemistry of the epipolythiopiperazine-3,6-diones, by C. Leigh & A. Taylor (pp. 228-285, 139 ref.); Phytopathogenic toxins from fungi: an overview, by H. H. Luke & R. H. Biggs (pp. 296-317, 99 ref.); Helminthosporium, Drechslera, and Bipolaris toxins, by O. L. Shotwell & J. J. Ellis (pp. 318-343, 86 ref.); and The structure and toxicity of the Alternaria metabolites, by D. J. Harvan & R. W. Pero (pp. 344-355, 74 ref.). A further 4 papers are abstracted separately and can be found via the author index under **United States of America,** American Chemical Society, Division of Agricultural & Food Chemistry [Mycotoxins Symposium]. AL

3

[Adsorptive behaviour of asbestos-containing filter sheets towards aflatoxin.] Über das Adsorptionsverhalten von asbesthaltigen Filterschichten gegenüber Aflatoxin.
Postel, W.; Görg, A.
Brauwissenschaft 29 (7) 193-197 (1976) [28 ref. De, en, fr] [Lehrstuhl für Allgemeine Lebensmitteltech., Tech. Univ. München, 8050 Freising-Weihenstephan, Federal Republic of Germany]

Studies on adsorption of aflatoxins from aqueous or alcoholic solutions by sheet filters are described; the model solutions used contained 0, 5, 7.5 or 10% alcohol, were adjusted to pH 3.0, 3.3 or 4.4, and contained added aflatoxin B_1 at concn. of 2, 5, 10 or 20 µg/l. Filtration trials were conducted with 4 types of Seitz filter sheets and with laboratory-prepared cellulose, kieselguhr and asbestos filters. Residual aflatoxin concn. in the filtered solutions were determined by TLC. Tables of results are given. The 4 commercial filter sheet types tested differed considerably in aflatoxin adsorption capacity. ≤64% of the aflatoxin was adsorbed by one type. The aflatoxin adsorption capacity decrease with increasing alcohol and aflatoxin concn. The studies with laboratory-prepared filters showed that kieselguhr and cellulose had little or no aflatoxin adsorption capacity. Anthophyllite asbestos adsorbed 70% of the aflatoxin. Non-acid-treated chrysotile asbestos removed 99-100% of the aflatoxin; acid-treatment of the asbestos reduced this value to 60%. The results are briefly considered in relation to beverage filtration. AJDW

4

[Residues of organochlorine pesticides and aflatoxin in genuine wines and in fruit mother juices.]
Cerutti, G.; Zappavigna, R.; Gerosa, A.; Ziliotto, R.
Rivista di Viticoltura e di Enologia 29 (1) 18-33 (1976) [8 ref. It, en] [Istituto di Ind. Agrarie, Univ., Milan, Italy]

68 samples of wine from agricultural or oenological institutes in Conegliano, Sassari, Bologna, Asti, S. Michele all'Adige, Trentino and Alto Adige; from single producers; and from the trade; and samples of apple and grape mother juices were examined for contents of α-, β- and γ-BHC, heptachlor, heptachlor epoxide, aldrin, dieldrin, endrin, pp'-DDE, pp'-DDT, op'-TDE and pp'-TDE, and for presence of aflatoxin. Results for organochlorine residue are tabulated for the individual wines or juices; in general, the contents were neglible, quantities of 0.01-0.02 ppm being exceptional; no residues were detected in 10% of the wines. No aflatoxin was detected in any of the samples. SKK

5

Distribution of aflatoxins in some samples of peanuts.
DiProssimo, V. P.

Journal of the Association of Official Analytical Chemists **59** (4) 941-944 (1976) [21 ref. En] [FDA, 850 Third Avenue, Brooklyn, New York 11232, USA]

Naturally occurring G aflatoxins were found at approx. 20 times the level of B aflatoxins in one lot of roasted, blanched peanuts. Official methods, as well as high-pressure liquid chromatography, were used to confirm this finding. Additional routine sample analysis data of raw and roasted peanuts revealed that this finding is not so unusual as formerly thought. It was found that 9.8% of the raw peanut samples contained higher levels of G than B aflatoxin; 4.9% containing 2-8 times more G than B aflatoxins. In a smaller sampling of roasted peanuts, 28% of the contaminated peanuts contained more G than B aflatoxins. AS

6

Aflatoxin contamination, fluorescence, and insect damage in corn infected with Aspergillus flavus before harvest.

Lillehoj, E. B.; Kwolek, W. F.; Peterson, R. E.; Shotwell, O. L.; Hesseltine, C. W.

Cereal Chemistry **53** (4) 505-512 (1976) [15 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

Asp. flavus infection of corn ears in S. Carolina fields before harvest was identified and recorded photographically; presence of the fungus was generally associated with insect activity. Asp. flavus-infected seed and characteristic kernel fluorescence were related to the occurrence of aflatoxin in corn samples. Fungal-contaminated kernels routinely exhibited 2 types of fluorescence: bright greenish-yellow (BGY) in the germ margin, or intense yellow throughout the endosperm. AS

7

Aspergillus flavus and aflatoxin in Iowa corn before harvest.

Lillehoj, E. B.; Fennell, D. I.; Kwolek, W. F.

Science, USA **193** (4252) 495-496 (1976) [13 ref. En] [N. Regional Res. Cent. USDA, Peoria, Illinois 61604, USA]

Aspergillus flavus and aflatoxin were detected in ears of Iowa corn on plants before harvest in 1975. Presence of the fungus was associated with kernel injury caused by the second generation European corn borer. Amounts of aflatoxin B_1 in corn from a limited number of selected ears ranged from 1 part per billion to 1560 parts per billion with a mean of 430 parts per billion. AS

8

Aspergillus flavus infection and aflatoxin production in mixtures of high-moisture and dry maize.

Lillehoj, E. B.; Fennel, D. I.; Hesseltine, C. W.

Journal of Stored Products Research **12** (1) 11-18 (1976) [13 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

High-moisture (h-m, 26.6-27.9%) and dry (d, 9.8%) white and yellow maize weiyy were examined for fungal development and aflatoxin (Af) production during an 8 wk incubation at 25°C. Treatment included blending h-m white with d yellow maize (or vice versa) to average moisture in blend of 14% and inoculation of some samples with Asp. flavus spores. At sampling time, white and yellow fractions were manually separated and all samples analysed for moisture, fungal infection and Af. Moisture levels in blends equilibrated rapidly during the initial 2-4 days of incubation to ≤13%. Only a limited incidence of Asp. flavus was observed on uninoculated maize, but high infection developed in inoculated maize; 58-98% of kernels in the d fractions of inoculated blends were infected. Af was detected in uninoculated h-m maize (max. 500 μg/kg in white, and 1000 in yellow maize after 16-58 days) and in both h-m and d fractions of inoculated blends (max. 500 μg/kg in a d fraction after 16-58 days). Max. Af levels were found in inoculated h-m maize, reaching 15 000 μg/kg in white and 20 000 in yellow maize after 58 days. RM

9

Variability associated with testing cottonseed for aflatoxin.

Whitaker, T. B.; Whitten, M. E.; Monroe, R. J.

Journal of the American Oil Chemists' Society **53** (7) 502-505 (1976) [9 ref. En] [N. Carolina State Univ., Raleigh, N. Carolina 27607, USA]

The sampling, subsampling, and analytical variance associated with testing cottonseed for aflatoxin were estimated by use of 4.54 kg samples, 100 g subsamples, and the Velasco method of analysis [FSTA (1973) 5 3G158]. Regression analysis indicated that each of the above variance components is a function of the concn. of aflatoxin in the populations tested. Functional relationships are presented to determine the sampling, subsampling, and analytical variance for any size sample, subsample, and number of analyses. AS

10

A survey of milk powder for aflatoxin content.

Lück, H.; Steyn, M.; Wehner, F. C.

South African Journal of Dairy Technology **8** (2) 85-86 (1976) [15 ref. En, af] [Anim. & Dairy Sci. Res. Inst., Irene, Transvaal, South Africa]

Aflatoxin M was determined in 56 samples of dried skim-milk and dried whole milk, from 6 different producers (3 of which were sampled at monthly intervals over a yr) using the method of Purchase & Steyn [Journal of the Association of Official Analytical Chemists (1967) **50** (2) 363-366]. No aflatoxins were detected in any of the samples (detection limits were 8 and 1 μg/kg for aflatoxins B_1 and M_1 respectively). LMB

11

Mycotoxins in South African cheeses.
Lück, H.; Wehner, F. C.; Plomp, A.; Steyn, M.
***South African Journal of Dairy Technology* 8** (2) 107-110 (1976) [15 ref. En, af] [Anim. & Dairy Sci. Res. Inst., Irene, Transvaal, South Africa]

42 samples of normal cheese, mouldy cheese and mould-ripened cheese (Gouda, Cheddar, Blue-veined and Camembert), manufactured in different parts of the country, were analysed for mycotoxins by standard TLC techniques. No indications were found that the cheeses contained aflatoxins, ochratoxins, sterigmatocystin, patulin or cyclopiazonic acid. Penicillium spp. were isolated from 33 of the samples. 46 of these isolates were tested for toxicity to ducklings. Of these 9 were highly toxic and 15 moderately toxic. The only other fungus isolated was Aspergillus ustus, which was found on 7 of the samples. All the isolates of A. ustus were highly toxic to ducklings. AS

12

The fate of aflatoxins in the preparation of protein concentrates and isolates from contaminated peanut and cottonseed flours.
Stoloff, L.; Trucksess, M.; Martinez, W.
***Journal of Food Science* 41** (5) 1251-1253 (1976) [10 ref. En] [Bureau of Foods, FDA, Washington, DC 20204, USA]

With the assistance of the laboratories of 6 major soybean protein producers, simulated commercial protein concentrate and isolate processes were applied to aflatoxin-contaminated peanut and cottonseed flours to determine the fate of the aflatoxins. Processes for producing concentrate by washing the flour at the protein isoelectric point (pH 4.5) were ineffective in separating the aflatoxin from the products, but a process using an aqueous alcohol wash accomplished a 90% reduction in the aflatoxin level of the concentrate compared to the flour. Processes for producing isolate by protein dissolution in alkali and its recovery by precipitation at the isoelectric point resulted in some aflatoxin loss but an increase in the aflatoxin concn. associated with the protein isolate compared to the original flour. However, a process applying carbon adsorbent to the alkaline solution accomplished a 90% reduction in the aflatoxin level of the isolate. IFT

13

Carcinogenic natural products.
Weisburger, E. K.
***Abstracts of Papers, American Chemical Society* 172**, AGFD 17 (1976) [En] [Carcinogen Metabolism & Toxicology Branch, Nat. Cancer Inst., Bethesda, Maryland 20014, USA]

Exposure to U and associated elements constitutes a cancer risk. Ingestion of high levels of As in drinking water leads to specific types of cancer. Plant products carcinogenic in animals include safrole, cycasin, β-asarone and alkaloids. Tannins have also been implicated as carcinogens. Of utmost importance are the toxic and carcinogenic principles formed by spoilage fungi associated with grain or oilseed crops. These include aflatoxins, sterigmatocystin, and other mycotoxins. In certain areas the high liver cancer incidence of the population is roughly correlated with the degree of aflatoxin contamination of foodstuffs. Chemical methods are available to deactivate aflatoxin, thus making possible the partial salvage of some contaminated crops. AS

14

[Toxic fungi in foods.] Moisissures toxiques dans l'alimentation. [Book]
Moreau, C.
Ed. 2, xi + 471pp. ISBN 2-225-38962-4 (1974) [2938 ref. Fr] Paris, France; Masson & Cie

This revised and enlarged 2nd edition of the book first published in 1968 contains the following chapters: Fungi in foods (pp. 3-30); Mycotoxicoses and mycotoxins (pp. 31-70); Aflatoxicosis (pp. 71-163); Clavacitoxicosis (pp. 165-179); Aspergillotoxicoses (pp. 181-216); Islanditoxicosis (pp. 217-225), caused by Penicillium islandicum; Penicilliotoxicoses (pp. 227-248); Fusariotoxicoses (pp. 249-270); Sporidesmiotoxicoses (pp. 271-278), caused by Pithomyces chartarum; Stachybotryotoxicosis (pp. 279-286); Various other mycotoxicoses (pp. 287-308); and Future perspectives (pp. 309-322). The book concludes with a bibliography (pp. 323-452) and a subject index (pp. 453-471). JA

15

Chemistry of aflatoxin B_1 and R_0.
Pawlowski, N. E.; Schoenhard, G. L.; Lee, D. J.; Nixon, J. E.; Loveland, P. M.; Sinnhuber, R. O.
***Abstracts of Papers, American Chemical Society* 172**, AGFD 62 (1976) [En] [Dep. of Food Sci. & Tech., Oregon State Univ., Corvallis, Oregon 97331, USA]

Aflatoxin B_1 was reduced chemically to aflatoxicol (aflatoxin R_0) under a variety of conditions. Aflatoxicol was resolved and racemized. The unnatural diastereomer has considerably less biological activity than the natural (microsomal reduced) isomer. Both diastereomers have identical spectroscopic properties. AS

16

[What's what in food poisoning.] [Review]
Goded y Mur, A.
***Ion (Madrid)* 36** (419) 367-375, 360 (1976) [many ref. Es]

This first contribution in a series of articles on food poisoning is devoted to aflatoxins. It discusses the chemical structure of the aflatoxins, production by toxigenic moulds, contamination of groundnuts, symptoms of aflatoxin poisoning, industrial uses of Aspergillus, legislation, detoxication, chemical properties, and detn. of aflatoxins in groundnuts, dairy products, wines, grape seeds and infant foods. RM

17

Effect of varying levels of dietary protein on tumor development and lipid metabolism in rats exposed to aflatoxin.

Wells, P.; Aftergood, L.; Alfin-Slater, R. B.
Journal of the American Oil Chemists' Society **53** (9) 559-562 (1976) [22 ref. En] [School of Public Health, Univ. of California, Los Angeles, California 90024, USA]

18

[Studies on mycotoxins in foods. VI. Detection of aflatoxins in peanuts and peanut products.]

Naoi, Y.; Ogawa, H.; Kazama, E.; Saito, K.; Kan, K.; Ibe, A.; Kimura, Y.
Annual Report of Tokyo Metropolitan Research Laboratory of Public Health **26** (1) 179-182 (1975) [2 ref. Ja] [Tokyo Metropolitan Res. Lab. of Public Health, 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo 160, Japan]

See FSTA (1976) **8** 9C444 for part V.

19

Monte Carlo technique to simulate aflatoxin testing programs for peanuts.

Whitaker, T. B.; Dickens, J. W.; Wiser, E. H.
Journal of the American Oil Chemists' Society **53** (8) 545-547 (1976) [9 ref. En] [Biol. & Agric. Eng. Dep., USDA, N. Carolina Univ., Raleigh, N. Carolina 27607, USA]

A computer model that accounts for sampling, subsampling, and analytical variability was developed to simulate aflatoxin testing programmes. Monte Carlo solution techniques were employed to account for conditional probabilities that arise from multiple samples, subsamples, and/or analyses being used in testing programmes. The aflatoxin testing programme to be used on the 1974 peanut crop was evaluated by use of the described model. AS

20

Aflatoxin and sterigmatocystin contamination of pistachio nuts in orchards.

Sommer, N. F.; Buchanan, J. R.; Fortlage, R. J.
Applied and Environmental Microbiology **32** (1) 64-67 (1976) [13 ref. En] [Dep. of Pomology, Univ. of California, Davis, California 95616, USA]

Aspergillus flavus and Asp. versicolor were both shown to be weak pathogens of developing pistachio fruits, producing aflatoxin and sterigmatocystin, respectively. Aflatoxin concn. approached those reported in cereal and legume seeds. Fungus lesions on the fruit hulls were followed by invasion of seeds despite the sclerified shell. Infections and mycotoxins present before harvest would presumably lead to further build-up after harvest if drying was slow or storage was under high humidity. AS

21

Effect of controlled atmosphere storage on aflatoxin production in high moisture peanuts (groundnuts).

Wilson, D. M.; Jay, E.
Journal of Stored Products Research **12** (2) 97-100 (1976) [10 ref. En] [Dep. of Plant Path., Univ. of Georgia, Coll. of Agric., Coastal Plain Sta., Tifton, Georgia 31794, USA]

Shelled peanuts remoistened to 16.7% were stored for 4 wk at about 27°C in air (0.03% CO_2, 21% O_2, 78% N_2) and in 3 modified atm. (i) 13.6% CO_2, 0.3% CO and 0.6% O_2 and 84.7% N_2; (ii) 12.2% CO_2, 3.1% CO, 0.3% O_2 and 83.5% N_2; (iii) 13.6% CO_2, 0.1% CO, 1.5% and 83.9% N_2. Aflatoxins, % free fatty acids and % kernel infection by Aspergillus flavus were determined weekly. Peanuts in air and in (iii) accumulated high aflatoxin levels in 1 and 2 wk respectively. In (i) and (ii) aflatoxin B_1 did not exceed 21 μg/kg and the % free fatty acids increased only slightly. None of the treatments entirely eliminated infection by the A. flavus group. After 4 wk peanuts in all treatments had visible fungal surface growth. AS

22

Aflatoxin occurrence in 1973 corn at harvest. II. Mycological studies. [Lecture]

Hesseltine, C. W.; Shotwell, O. L.; Kwolek, W. F.; Lillehoj, E. B.; Jackson, W. K.; Bothast, R. J.
Mycologia **68** (2) 341-353 (1976) [21 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

The following were determined in freshly harvested samples of corn obtained from north eastern S. Carolina: amount of Aspergillus flavus-infected kernels, Asp. flavus spores on corn surface, total amount of fungus-infected kernels, Asp. flavus spores on and in insects from corn, and correlation between Asp. flavus infection and occurrence of aflatoxin. Of 297 samples, 152 were aflatoxin-positive with 120 showing ≥1 kernel internally infected with Asp. flavus. Of the 145 aflatoxin-negative samples, 59 showed infection. Of the 297 samples, 276 had ≥1 kernel with surface spore contamination; in 75 samples every kernel was contaminated. When kernels were surface sterilized, 224 showed 100% internal mould contamination. ≥1 kernel of 185 samples was infected with Asp. flavus; this number represents 60% of total samples. Of 375 insects collected from the corn samples, 247 showed Asp. flavus present (including 78 of 85 rice weevils). Besides Asp. flavus, the predominant internal fungi were spp. of Penicillium and Fusarium. Members of the Mucorales were rarely seen. [See FSTA (1976) **8** 3M291 for part I.] AS

23

[Studies on fungal contamination of foodstuffs in Japan; fungal and aflatoxin contamination of sesame and its products marketed in Tokyo.]

Hitokoto, H.; Morozumi, S.; Wauke, T.; Sakai, S.; Zen-Yoji, H.

Annual Report of Tokyo Metropolitan Research Laboratory of Public Health **26** (1) 30-35 (1975) [19 ref. Ja, en] [Tokyo Metropolitan Res. Lab. of Public Health, 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo 160, Japan]

A survey of fungal and aflatoxin contamination was carried out on 39 batches of sesame seed and 3 of sesame paste obtained from the retail market in Tokyo. Counts of filamentous fungi in seeds ranged from 1 to 275/150 seeds (average 28); filamentous fungi were found in only 1 of the batches of paste (count of 14/g). Dominant species among the 1173 fungal isolates were: Aspergillus ruber, Asp. chevarieli, Asp. flavus, Asp. candidus and Penicillium variable; these species constituted 56.7% of the total isolates. 96 Asp. flavus isolates produced aflatoxin when grown on SL medium, and 22 Asp. versicolor isolates produced sterigmatocystin when grown on YES medium. 12 of the aflatoxin-producing strains produced large amounts (20-30 μg/ml) of aflatoxin B_1. Aflatoxin was not detected in sesame seeds or paste. [See also FSTA (1976) **8** 9H1659.] AS

24

[Aflatoxin B_1 in oilseeds other than groundnuts.]
Monacelli. R.; Aiello, E.; Muccio, A. di; Salvatore, G.; Dattolo, G.
Rivista della Societa Italiana di Scienza dell'Alimentazione **5** (7/8) 259-261 (1976) [9 ref. It, en] [Istituto Superiore di Sanita, Rome, Italy]

A total of 295 samples of oilseeds (including sunflower seed, sesame seed, soybeans, linseed, pumpkin seed, watermelon seed, cucumber seed, hemp seed, rapeseed, mallow seed, castor seed, niger seed) was tested for aflatoxin B_1 by TLC. Only 8 samples were found to contain aflatoxin B_1: 2 samples of sunflower seed (containing 0.05 and 0.09 mg aflatoxin/kg; 2 samples of sesame seed (0.05 and 0.06 mg/kg); 2 samples of rapeseed (0.018 and 0.024 mg/kg); 1 sample of soybeans (0.18 mg/kg); and 1 sample of pumpkin seed (0.024 mg/kg). AJDW

25

[Carry-over of aflatoxins into meat.] Carry-over Effekt von Aflatoxinen bei Fleisch. (In 'Rückstände in Fleisch und Fleischerzeugnissen' [see FSTA (1977) **9** 2S164].) [Lecture]
Lötzsch, R.; Leistner, L.
pp. 130-140 (1975) [33 ref. De, en] [Inst. für Bakteriologie & Histologie, Bundesanstalt für Fleischforschung, 865 Kulmbach-Blaich, Federal Republic of Germany]

Literature data for transfer of aflatoxins from the diet to the edible tissues of slaughter animals are discussed. A study on transfer of aflatoxin B_1 from the feed to the thigh muscle, breast muscle and liver of broilers is described. Diets containing 0-15.0 ppm aflatoxin were used; the broilers were slaughtered after 8 wk on the experimental feeds. Tables of results are given. Aflatoxin B_1 was detectable in samples from broilers fed diets containing ≥0.1 ppm aflatoxin. Residue concn. increased with increasing concn. in the diet; max. concn. recorded were (parts/billion): liver, 21.10; thigh 24.20; and breast 12.20. These results are discussed in relation to proposed tolerances for aflatoxins in meat in the Federal Republic of Germany. AJDW

26

[Mycotoxin formation in meat products.]
Mykotoxin-Bildung in Fleischwaren. (In 'Rückstände in Fleisch und Fleischerzeugnissen' [see FSTA (1977) **9** 2S164].) [Lecture]
Leistner, L.; Mintzlaff, H.-J.; Maing, I.-Y.
pp. 141-148 (1975) [27 ref. De, en] [Inst. für Bakteriologie & Histologie, Bundesanstalt für Fleischforschung, 865 Kulmbach-Blaich, Federal Republic of Germany]

Potential problems of mycotoxin formation by moulds growing on meat and meat products are discussed, on the basis of literature data. Aspects considered include: desirable and undesirable Penicillium spp. on meat products (with special reference to mould-ripened products); the formation of hitherto unidentified toxins by Penicillium spp.; the importance of use of non-toxigenic starters for mould-ripened products; toxin formation by Aspergillus spp. in meat products; and use of potassium sorbate for control of mould growth on sausages, etc. AJDW

27

Mould contamination of meat products.
Hadlok, R.; Samson, R. A.; Stolk, A. C.; Schipper, M. A. A.
Fleischwirtschaft **56** (3) 372-376 (1976) [many ref. En, De, fr] [92 Frankfurter Strasse, 6300 Giessen, Federal Republic of Germany]

425 strains of mould isolated during 10 yr investigations from 207 mould-contaminated meat products (mostly raw cured, from 153 manufacturers) were identified and the results are shown in tables. 239 strains (56.2%) belonged to the genus Penicillium, mainly P. cyclopium, viridicatum, chrysogenum and frequentans; 144 strains (33.9%) to the genus Aspergillus, mainly A. glaucus, versicolor, flavus and fumigatus. The remaining 42 strains (9.9%) belonged to the orders Moniliales and Mucorales. The results differed from those reported by other authors, possibly due to the material (mould-ripened dry sausage). The most interesting mycotoxins produced by the mycoflora were aflatoxin sterigmatocystin, penicillic acid, cyclopiazonic acid, ochratoxin and tremortin. They were not attributed to individual strains. RM

28

Inhibition of aflatoxin accumulation in smoked substrates.
Arseculeratne, S. N.; Samarajeewa, U.; Welianga, L. V.
Journal of Applied Bacteriology **41** (2) 223-233

(1976) [22 ref. En] [Dep. of Microbiol., Fac. of Med., Univ. of Sri Lanka, Peradeniya, Sri Lanka]

The pattern of fungal colonization on processed (smoked) copra kernels and the levels of aflatoxin detected in copra and in a culture of Aspergillus flavus on fresh coconut suggested that aflatoxin accumulation was inhibited by the smoking process. This paper describes a study of the smoking process under laboratory conditions with fresh coconut and potato dextrose broth; aflatoxin accumulation was found to be significantly or totally inhibited in both smoked coconut and in smoked broth. Mycelial growth was inhibited to a lesser degree. On account of the urgent need for simple, cheap and efficent techniques for the processing and safe storage of food substrates, especially in poor tropical countries, the authors suggest that the smoking process deserves study under industrial conditions for the protection of other agricultural food crops (e.g. groundnut). AS

29

A rapid screening method for the aflatoxins and ochratoxin A.
Holaday, C. E.
Journal of the American Oil Chemists' Society 53 (9) 603-605 (1976) [6 ref. En] [Nat. Peanut Res. Lab., PO Box 637, Forrester Drive, Dawson, Georgia 31742, USA]

A rapid, economical minicolumn procedure for screening aflatoxins and ochratoxin A in a wide range of products (wheat, barley, sorghum, corn, rice, rye and peanuts) is presented. The technique includes high speed blending of the sample with aqueous methanol, purification of the extract with a solution of zinc sulphate and phosphotungstic acid, partitioning in benzene, and minicolumn chromatography. Sensitivities of 4 parts/billion (ppb) for the aflatoxins and 20 ppb for ochratoxin A could be achieved; and the simplicity of the method, which includes the use of disposable plastics and glass items, makes the method practical for field or in-plant applications. AS

30

Applications of mass spectrometry to the analysis of mycotoxins. [Review]
Kingston, D. G. I.
Journal of the Association of Official Analytical Chemists 59 (5) 1016-1022 (1976) [19 ref. En] [Dep. of Chem., Virginia Polytech. Inst. & State Univ., Blacksburg, Virginia 24061, USA]

Methods of identifying mycotoxins by MS are reviewed, with special reference to the value of a complete listing of known fungal metabolites, arranged by mol. wt. Such a list is applied to the identification of various mycotoxins, and MS is applied to the structural elucidation of dimethylnidurufin and ostreogrycin A. AS

31

[Moulds and mycotoxins in foods.]
Josefsson, E.; Nilsson, G.
Var Foeda 28 (8) 183-188 (1976) [Sv] [Statens Livsmedelsverk, 751 26 Uppsala, Sweden]

32

Silica gel medium to detect molds that produce aflatoxin.
Torrey, G. S.; Marth, E. H.
Applied and Environmental Microbiology 32 (3) 376-380 (1976) [8 ref. En] [Dep. of Food Sci., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

A chemically defined nutrient solution containing tartaric acid was made solid by mixing it with an alkaline silicate solution. Production of aflatoxin by aspergilli growing on the silica gel medium coincided with the presence of a blue fluorescent area surrounding colonies, as observed under long-wave UV light. Presence of aflatoxin in the medium was confirmed by drying the gels, extracting them with chloroform-methanol, and examining extracts for fluorescent materials by viewing them on thin-layer chromatograms under UV light. AS

33

Effect of temperature cycling on the production of aflatoxin by Aspergillus parasiticus.
Stutz, H. K.; Krumperman, P. H.
Applied and Environmental Microbiology 32 (3) 327-332 (1976) [13 ref. En] [Dep. of Food Sci. & Tech., Oregon State Univ., Corvallis, Oregon 97331, USA]

Asp. parasiticus was grown under cyclic temp. conditions on rice and nutmeat substrates. With diurnal and nocturnal time-temp. sequencing, total heat input is an important factor in toxin production. When expressed in degree h/day, thermal input provides a finite number, which can be related to observable changes, e.g. sporulation and toxin biosynthesis. 3 well-defined levels of response were observed in relation to heat input: no growth at thermal inputs of <208 degree h/day; mycelial growth as well as copious amounts of an orange pigment at thermal inputs of 208-270 degree h/day; sporulation and aflatoxin biosynthesis above 270 degree h/day. Between optimum and min. thermal input, cycling temp. significantly reduced the period of the trophophase over cultures receiving equal heat input at a constant rate. Cycling temp. at the low and high extremes of the temp. range had little or no effect upon growth pattern of the culture. Asp. parasiticus did not compete well when mixed with natural fungal isolates from nutmeats and was easily overgrown by wild isolates even at relatively high thermal input and when present in superior numbers. This factor and heat input generally below that required for toxin biogenesis at harvest time appear to be 2 significant factors that limit occurrence of aflatoxin on nut crops of the Willamette Valley (Oregon). These factors are likely to have significance for other crops grown and harvested under similar circumstances. AS

34

Inhibition of aflatoxin formation by 2-mercaptoethanol.

Gupta, S. K.; Maggon, K. K.; Venkitasubramanian, T. A.

Applied and Environmental Microbiology **32** (3) 324-326 (1976) [19 ref. En] [Dep. of Biochem., Vallabhbhai Patel Chest Inst., Univ. of Delhi, Delhi-110007, India]

2-Mercaptoethanol inhibits growth of Aspergillus parasiticus NRRL 3240 and aflatoxin formation by the fungus. When added to the resuspended medium, 2-mercaptoethanol inhibited [1-^{14}C]acetate incorporation into both aflatoxins and neutral lipids, thereby showing that it acts at an early stage of aflatoxin biosynthesis. The inhibition is probably due to its chelating action on Zn, which is essential for aflatoxin production. It is proposed that any chelating agent that selectively binds to Zn will inhibit aflatoxin formation both in laboratory media and in natural substrates, e.g. groundnuts, soybeans. [See also FSTA (1975) **7** 11J1730 & (1976) **8** 3C131.] AS

35

Information bearing on the evaluation of the hazard to man from aflatoxin ingestion.

Stoloff, L.; Friedman, L.

PAG [Protein-Calorie Advisory Group] Bulletin **6** (2) 21-32 (1976) [76 ref. En] [Bureau of Foods, FDA, Washington, DC 20204, USA]

Questions are put and answers given on the applicability of data on the susceptibility of rats to aflatoxins to the possible hazard to man from aflatoxin ingestion. Epidemiological evidence relating to the susceptibility of man to aflatoxin carcinogenesis, the question of other possible causes of liver cancer, and the possible relationship of liver, kidney and colon cancer in the USA to aflatoxin exposure are also discussed. AL

36

A field survey of pistachio (Pistacia vera) nut production and storage in Turkey with particular reference to aflatoxin contamination.

Denizel, T.; Jarvis, B.; Rolfe, E. J.

Journal of the Science of Food and Agriculture **27** (11) 1021-1026 (1976) [28 ref. En] [Nat. Coll. of Food Tech., St George's Avenue, Weybridge, Surrey, UK]

A field study of soils and pistachio nuts in 3 major pistachio-growing areas of Turkey was undertaken. The predominant soil fungus isolated from all 3 areas was Aspergillus niger; isolates of Fusarium, Trichoderma, Mucor and Rhizopus species were also common. Asp. flavus and Asp. ochraceus and related organisms were isolated only from the plateau of Gaziantep. The dominant external mycoflora of the immature nuts from all sites consisted of Asp. niger, Asp. flavus and Penicillium spp. There was no evidence for fungal contamination of immature endosperms nor of freshly dehulled nuts, but stored dehulled nuts and dust samples taken from warehouses were extensively contaminated with Asp. flavus, Asp. niger and Asp. ochraceus. Of 43 Asp. flavus isolates tested, 20 produced aflatoxins on laboratory media or on rice; all 11 isolates of Asp. ochraceus tested produced ochratoxin A on laboratory media. The results obtained are discussed in relation to agricultural and marketing practices for Turkish pistachio nuts. AS

37

Moisture-equilibrium relative humidity relationships in pistachio nuts with particular regard to control of aflatoxin formation.

Denizel, T.; Rolfe, E. J.; Jarvis, B.

Journal of the Science of Food and Agriculture **27** (11) 1027-1034 (1976) [14 ref. En] [Nat. Coll. of Food Tech., St George's Avenue, Weybridge, Surrey, UK]

Adsorption and desorption isotherms were determined both manometrically and by wt. equilibration for Turkish pistachio nut kernel, shell and hull. Comparison of the calculated and experimentally determined adsorption isotherms for whole nuts showed good correlation. Nuts inoculated with Aspergillus flavus conidia were equilibrated to various equilibrium RH (ERH) levels and stored in controlled environment cabinets at 28°C. Competitive growth of xerophilic strains of Asp. amstelodami prevented growth and aflatoxin production by the Asp. flavus at ERH of 86% and below. At 88% ERH, marked aflatoxin production occurred but competition was observed between Asp. flavus and Asp. niger. In sealed containers, metabolic moisture from growth of Asp. amstelodami raised the ERH from the initial 85% and permitted toxin production by Asp. flavus. The results are discussed in relation to post-harvest handling and storage of pistachio nuts. AS

38

[Formation of aflatoxins in wheat grain induced by self-heating, and changes in the chemical composition of the grain caused by development of storage moulds.]

L'vova, L. S.; Sosedov, N. I.; Gerel, U.; Schwarzman, M. I.; Shatilova, T. I.; Shulgina, A. P.

Prikladnaya Biokhimiya i Mikrobiologiya **12** (5) 741-749 (1976) [12 ref. Ru, en] [All-Union Res. Inst. of Grain & Grain Products, USSR]

The microflora of wheat harvested in a wet (1973) and a dry (1972) season was investigated. Penicillium, Mucor and, particularly, Aspergillus spp. were the main 'storage moulds' found on mounds of grain in various conditions: normal, mouldy, 'self-heating'; Asp. flavus predominated in the self-heating mounds. The season had no effect on the content of toxigenic Asp. flavus strains.

which was 6.8% for both yr. Aflatoxins (B_1 and G_1) were detected in 17.4% of the self-heating grain, reaching 550 μg/kg in one mound. The surface layer to a depth of about 70 cm was the most susceptible to mould contamination. The effects of self-heating on grain, flour and baking characteristics (glassiness, flour ash and whiteness, bread yield, dimensions and appearance) were also studied. Self-heating led to a decline in flour and baking characteristics. HBr

39

[Short-chain fatty acids as preservatives in cereals and cereal products.] [Lecture]
Widhe, T.
SIK Rapport No. 384, 53-60 (1975) [Sv] [AB Juvel, Stockholm, Sweden]

Problems with growth of microorganisms in stored grain, flour and bread are discussed, with special reference to toxigenic moulds. Effects of storage conditions, factory hygiene, etc. on the microbiological quality of cereals and cereal products are considered. The potential for use of short-chain fatty acids and other acids (including acetic, propionic, isobutyric, lactic, sorbic and myristic acids) as preservatives in grain, flour and bakery products is discussed, with reference to effects of these preservatives on the quality of the product. [See also FSTA (1977) 9 3E89.] AJDW

40

Radiation sensitivity of some toxigenic molds isolated from deteriorated rice.
Choi, E.-H.; Kim, H.-L.; Lee, S.-R.
Korean Journal of Food Science and Technology 7 (3) 148-153 (1975) [26 ref. En, ko] [Agric. Biochem. Lab., Korea Atomic Energy Res. Inst., Seoul, Korea]

7 moulds (4 Aspergillus spp., 3 Penicillium spp.) isolated from spoiled rice and reported to be capable of producing mycotoxins were examined for their sensitivity to γ-rays from a ^{60}Co source. 2-ml aliquots of suspensions containing 10^7-10^8 conidia/ml were irradiated at dose rates of 2.67 or 11.56 krad/min. The irradiated suspensions were diluted, plated, incubated for 3-5 days at 30°C and the colonies counted. Conidia of all spp. showed survival curves of a sigmoidal type. Decimal reduction doses and induction doses were deduced from the survival curves. With a dose rate of 11.56 krad/min, D_{10} values (the radiation dose required to kill 90% of the test organisms) ranged from 14 (P. citrinum) to 33 (Asp. fumigatus) krad, the induction dose from 12 (P. implicatum) to 56 (Asp. ochraceus) krad, and the inactivation factor at 200 krad from 4.6 (Asp. fumigatus) to 12.8 (P. citrinum). D_{10} values were higher at the lower dose rate but the induction dose was the same for both rates. The relevance of these results to the development of food irradiation methods is discussed. JA

41

Testing and control program for aflatoxins in imported in-shell Brazil nuts.
United States of America, Food & Drug Administration
Federal Register 41 (168, Aug. 27) 36232-36233 (1976) [En] [Washington, DC, USA]

Under an agreement between USDA and FDA, imported Brazil nuts will be sampled according to the following schedule of number of bags in lot, number of bags sampled, and total pounds in sample: 200, 20, 20; 201-800, 40, 40; and 801-2000, 60, 60. In-shell nuts are ground with shell and analysed by the AOAC-BF method [see Section 26.020-26.024 Official Methods of Analysis of the AOAC 12th ed.]. Aflatoxin is calculated on basis of the kernel constituting 50% of the wt. If aflatoxin is present above the current action level, the analysis may be repeated using a shelled sample. The lot is acceptable if the kernel analysis is at or below the current action level. CAS

42

The occurrence and control of mycotoxins and mycotoxicoses.
Rodricks, J. V.
Food and Nutrition 2 (1) 9-14 (1976) [11 ref. En] [Div. of Chem. & Physics, FDA, DC, USA]

Consideration is first given to the use of the terms mycotoxins and mycotoxicoses. 3 categories are defined into which mycotoxins and mycotoxicoses fall: (i) mycotoxicoses which can be attributed to specific mycotoxins or groups of mycotoxins; (ii) mycotoxicoses for which the specific, causative mycotoxin(s) has not been identified; and (iii) mycotoxins which have been identified as natural contaminants of foods or feeds but for which no specific mycotoxicosis has been identified. Control of mycotoxicoses is discussed, and the current aflatoxin situation is summarized. Tabulated data are presented on: some important mycotoxins (name of mycotoxin and major producing fungus); some important toxicoses of man and animals in which mycotoxins are involved (toxicosis, affected spp., food source, mycotoxin, and category); and some mycotoxins found as food contaminants but for which the human health risk is uncertain or completely unknown (mycotoxin-susceptible foods, and possible human health consequences of long-term ingestion). VJG

43

A consideration of the mycotoxin hypothesis with special reference to the mycoflora of maize, sorghum, wheat and groundnuts. [Review]
Martin, P. M. D.; Gilman, G. A.
Report, Tropical Products Institute G105, vii + 112pp. ISBN 0-85954-054-5 (1976) [35pp. of ref. En] Price £2.00 [Tropical Products Inst., 56/62 Gray's Inn Road, London WC1X 8LU, UK]

This review aims to trace the connection between the mycology of foodstuffs and the onset of disease due to the toxins that various fungi produce within those foodstuffs. The information is arranged under the following headings: The physiology of fungi in relation to harvesting and storage (pp. 4-18); The natural incidence of fungi in foodstuffs (pp. 19-22); The ecology of mycotoxin formation (pp. 23-30); The natural occurrence of mycotoxins (pp. 31-34); The role of fungi in non-invasive pathology (pp. 35-51), including allergic illness and mycotoxicosis; and The association of mycotoxins with malignant disease (pp. 52-62). 9 appendices are included: Mycotoxicosis with multiple aetiology: some of the main syndromes (pp. 66-67); Mycotoxicosis caused by aflatoxin, primarily involving the liver (p. 68); Disease syndromes associated with Fusarium graminearum (p. 69); Disease syndromes associated with Fusarium sporotrichioides (p. 70); Mycotoxicosis attributable to Stachybotrys alternans (p. 70); Mycotoxicosis caused by rusts and smuts (p. 71); Other toxigenic fungi (pp. 72-73); Summary of the chief mycotoxins and their causal agents (pp. 74-75); and Summary of the chief toxigenic funig whose metabolites have been named and/or chemically determined (pp. 76-77). VJG

44

[The current position in mycotoxin research.] Wo steht die Mykotoxinforschung heute?
Frank, H. K.
Umschau in Wissenschaft und Technik 76 (24) 785 (1976) [2 ref. De] [Bundesforschungsanstalt für Ernährung, Karlsruhe, Federal Republic of Germany]

Recent developments in mycotoxin research are briefly considered, with reference to: toxicity and carcinogenicity; detoxification of contaminated foods or feeds; analytical methods; possible methods for control of growth and toxin biosynthesis by fungi on foods; and the health hazard from mouldy foods. AJDW

45

An assay of sterigmatocystin and related metabolites of Aspergillus versicolor by high speed liquid chromatography.
Ito, K.; Yamane, A.; Hamasaki, T.; Hatsuda, Y.
Agricultural and Biological Chemistry 40 (10) 2099-2100 (1976) [14 ref. En] [Food Tech. Inst. of Tottori Prefecture, Sakaiminato, Tottori 684, Japan]

46

[Danger to human health of mycotoxins.] Gefährdung der menschlichen Gesundheit durch Mykotoxine. [Review]
Reiss, J.
Zeitschrift fuer Ernaehrungswissenschaft 15 (2) 168-176 (1976) [many ref. De, en] [Mikrobiol. Lab., Grahamhaus Studt KG, Bad Kreuznach, Federal Republic of Germany]

47

Aflatoxin production on irradiated foods.
Priyadarshini, E.; Tulpule, P. G.
Food and Cosmetics Toxicology 14 (4) 293-295 (1976) [26 ref. En] [Nat. Inst. of Nutr., Indian Council of Med. Res., Jamai Osmania, Hyderabad-500007, India]

Investigations were carried out into toxin production under laboratory conditions in (i) wheat, (ii) maize, (iii) sorghum, (iv) pearl millet, (v) potatoes and (vi) onions irradiated with a ^{60}Co source (10 krad for (v) and (vi) and 75 krad for the other foods). Flasks containing sterile irradiated or non-irradiated foods were inoculated with Aspergillus parasiticus spores; and then incubated at 27° C for 7 days. Aflatoxin B_1 (μg/g) production for non-irradiated and irradiated samples respectively were: (i) 208.1, 303.2; (ii) 125.6, 165.0; (iii) 25.1, 45.3; (iv) 27.3, 45.3; (v) 0.85, 1.48; and (vi) 0.70, 1.28. Increase (%) in aflatoxin in irradiated foods (i) to (vi) respectively were: 45.7, 31.4, 80.8, 66.0, 74.4 and 84.0. Irradiated foods consistently showed an appreciable increase in aflatoxin production. VJG

48

Topical bacteriological problems.
Schenkel, J.
CCB Review for Chocolate, Confectionery and Bakery 1 (4) 37-38 (1976) [12 ref. En]

The occurrence of Salmonella and moulds in chocolate and the effects of the toxins are described. Salmonella can be present on or in certain raw materials used by the chocolate industry, they can survive low roasting temp., can be carried in cocoa dust, and cannot safely be destroyed by conching even at temp. of 72° C. All raw materials suspected of harbouring Salmonella should be carefully examined prior to entering the factory, and the importance of hygiene observance by personnel is stressed. Moulds and their toxins (aflatoxins and others) are discussed, together with the difficulty in detecting them in cocoa beans and intermediate cocoa products. AL

49

[Analysis of mycotoxins. V. Systematic analysis of mycotoxins in grains.]
Takeda, Y.; Isohata, E.; Amano, R.: Uchiyama, M.; Naoi, Y.; Nakao, M.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] 17 (2) 193-199 (1976) [4 ref. Ja, en] [Nat. Inst. of Hygienic Sci., Kamiyoga 1-chome, Setagaya-ku, Tokyo, Japan]

Systematic analysis for the simultaneous detn. of the fluorescent mycotoxins aflatoxins B_1, B_2, G_1 and G_2, sterigmatocystin, ochratoxin-A and citrinin in grains was studied. The mycotoxins were extracted with H_2SO_4, KCl and acetonitriles, fractionated by silica gel column chromatography, and determined by TLC. [See FSTA (1975) 7 7M783 for part IV.] TM

50

The occurrence of aflatoxin-producing strains of Aspergillus flavus in the mould floras of ground spices.
Flannigan, B.; Hui, S. C.
Journal of Applied Bacteriology 41 (3) 411-418 (1976) [21 ref. En] [Dep. of Brewing & Biol. Sci., Heriot-Watt Univ., Chambers Street, Edinburgh, EH1 1HX, UK]

All of 20 different ground spices and 3 mixtures purchased in the UK were significantly contaminated by bacteria, and only cloves were free from moulds; thermophilic actinomycetes were isolated from only 6 spices. In general, the mould floras were dominated by Aspergillus spp., Asp. glaucus (group) and Asp. niger being the most common. Asp. flavus was found in 14 spices, and 7 of 24 strains examined produced aflatoxins in vitro. Whole ginger and Jamaica, red and white peppers supported growth of Asp. flavus strains and production of aflatoxins. AS

51

[Microbial spoilage of foods.] Mikrobieller Verderb von Lebensmitteln.
Schmidt-Lorenz, W.
Temperatur Technik 14 (4) 95-100 (1976) [De] [Eidgenössische Tech. Hochschule, Zürich, Switzerland]

After a brief survey of environmental and historical aspects of the nature and occurrence of microorganisms, the microbial contamination of foodstuffs, the conditions under which microorganisms are most likely to be encountered, and the means available for their detection are discussed. Some common causes of food poisoning are discussed, including the slow cooling of large amounts of meat or gravy in catering establishments; the highly toxic nature of mycotoxins produced in stored grains is emphasized. The development of visible or organoleptic signs of spoilage is correlated with the rate of growth of bacteria in certain products, including beef and poultry. BDH

52

[Aflatoxin. Toxicity, occurrence on foods, and analytical methods.] [Review]
Manabe, M.
Journal of Japan Oil Chemists' Society [Yukagaku] 25 (10) 698-710 (1976) [57 ref. Ja] [Nat. Food Res. Inst., Min. of Agric. & Forestry, 1-4-12 Shiohama, Koto-ku, Tokyo, Japan]

53

Biosynthesis of aflatoxin B_1. Conversion of versicolorin A to aflatoxin B_1 by Aspergillus parasiticus.
Lee, L. S.; Bennett, J. W.; Cucullu, A. F.; Ory, R. L.
Journal of Agricultural and Food Chemistry 24 (6) 1167-1170 (1976) [22 ref. En] [S. Regional Res. Cent., USDA, New Orleans, Louisiana 70179, USA]

54

Biosynthesis of aflatoxin. Conversion of norsolorinic acid and other hypothetical intermediates into aflatoxin B_1.
Hsieh, D. P. H.; Lin, M. T.; Yao, R. C.; Singh, R.
Journal of Agricultural and Food Chemistry 24 (6) 1170-1174 (1976) [28 ref. En] [Dep. of Environmental Toxicology, Univ. of California, Davis, California 95616, USA]

55

A review of sampling plans and collaboratively studied methods of analysis for aflatoxins. [Review]
Schuller, P. L.; Horwitz, W.; Stoloff, L.
Journal of the Association of Official Analytical Chemists 59 (6) 1315-1343 (1976) [129 ref. En] [Lab. for Chem. Analysis of Foodstuffs, Nat. Inst. of Public Health, PO Box 1, Bilthoven, Netherlands]

56

[The problem of mycotoxins in foods.] Das Problem der Mykotoxine in Lebensmitteln. [Lecture]
Frank, K. H.
Chimia 30 (10) 455-456 (1976) [8 ref. De] [Bundesforschungsanstalt für Ernährung, Engesserstrasse 20, D-75 Karlsruhe 1, Federal Republic of Germany]

The occurrence, formation and toxicity of mycotoxins in foods are briefly reviewed, with particular reference to aflatoxins, sterigmatocystin and patulin. RM

57

Do mycotoxins present a potential hazard for intermediate moisture foods? (In 'Intermediate moisture foods' [see FSTA (1977) 9 5G328].) [Lecture]
Jarvis, B.
pp. 239-247 (1976) [31 ref. En] [Leatherhead Food Res. Ass., Randalls Road, Leatherhead, Surrey, UK]

About 200 microfungi are capable of producing mycotoxins (most also able to grow in reduced water activity conditions), although many have not yet been implicated in clinical outbreaks. Factors affecting growth and toxin production by a few mycotoxinogenic fungi are briefly considered, together with the implications for manufactured intermediate moisture foods. AL

58

[Improvement of the detection limit for aflatoxins in high-pressure liquid chromatography, by the use of Kieselgel-filled fluorescence detectors.] Verbesserung der Nachweisgrenze von Aflatoxinen in der Hochdruck-Flüssigkeits-Chromatographie durch Verwendung eines kieselgefüllten Fluoreszenzdetektors.
Zimmerli, B.
Journal of Chromatography **131**, 458-463 (1977) [18 ref. De] [Abteilung Lebensmittelkontrolle, Eidgenössisches Gesundheitsamt, Sektion Pestizidrückstände & Kontaminationen, Haslerstrasse 16, 3008 Bern. Switzerland]

Studies were conducted on the effects of filling the fluorescence detector cell with Kieselgel 60 (either silanized or non-silanized) on the detection limits for aflatoxins B_1, B_2, G_1, G_2 and M_1. The aflatoxins were separated by 3 high pressure liquid chromatography systems, using Porasil, Bondapak CN or Bondapak C18 stationary phases. The results show that filling the fluorescence cell with either silanized or non-silanized Kieselgel considerably increased fluorescence signal strength (by factors of 1.6 to approx. 5000), and consequently gave much lower detection limits than use of non-filled cells. With filled cells, the best separation system gave the following aflatoxin detection limits (pg): B_1, 120; B_2, 80; G_1, 120; and G_2, 40. AJDW

59

Proceedings of the 3rd International Biodegradation Symposium. Sessions IV, XIV. [Conference proceedings]
Sharpley, J. M.; Kaplan, A. M. (Editors)
v + 523-649pp. ISBN 0-85334-706-9 (1976) [many ref. En] Barking, Essex, UK; Applied Science Publishers Ltd. Price £7.00 [Sharpley Lab. Inc., Fredericksburg, Virginia, USA]

[Continued from preceding abstr.] Nonchemical control of postharvest deterioration of fresh produce, by W. L. Smith, Jr. (pp. 577-587, 42 ref.); Nature and importance of mycotoxins in grains, by U. L. Diener, N. D. Davis & G. Morgan-Jones (pp. 589-605, 73 ref.); Mycotoxins other than aflatoxins, by C. W. Hesseltine (pp. 607-623, 68 ref.), e.g. penicillic acid, patulin, sterigmatocystin, Alternaria toxins, emetic and rejection factors, zearalenone, ochratoxin, citrinin, T-2 toxin; An evaluation of environmental factors and occurrence of aflatoxin in Virginia shelled peanuts: 1964 to 1968, by C. A. Sledd, T. Eadie, C. E. O'Rear & G. C. Llewellyn (pp. 625-634, 23 ref.); Degradation of barley by Aspergillus fumigatus Fres., by P. N. Sellars, C. E. G. McGill & B. Flannigan (pp. 635-643, 15 ref.); and Microbial rot of cocoyam (Xanthosoma sagittifolium (L) Schott) in storage in Nigeria, by S. K. Ogundana (pp. 645-649, 11 ref.). A subject index is included. JA

60

[Aflatoxins B_1, B_2, G_1 and G_2 in retail food samples.] Vorkommen der Aflatoxine B_1, B_2, G_1 und G_2 in Lebensmittelproben des Handels.
Laub, E.; Woller, R.
Deutsche Lebensmittel-Rundschau **73** (1) 8-10 (1977) [5 ref. De, en, fr] [Chem. Untersuchungsamt, Trier, Federal Republic of Germany]

More than 1000 samples of various foods were analysed for aflatoxins in 1974-1976; tables of results are given. Aflatoxins were detected in Brazil nuts, almost and almond products, extruded corn/groundnut products, and various other groundnut products; no aflatoxins were detected in cheese, fruit juice concentrates, wines, chestnuts, sesame products, cereal + nut products, coconut products, walnuts, hazel nuts, marzipan or mixed nut products. The highest aflatoxin concn. were recorded in spoiled Brazil nuts, which contained ≤4000 parts/billion (ppb) aflatoxin B_1 + ≤4000 ppb aflatoxin G_1. High aflatoxin concn. were also recorded in groundnuts (≤2000 ppb aflatoxin B_1 + ≤1000 ppb aflatoxin G_1). Groundnut products from 11 manufacturers were evaluated; incidence of aflatoxin-positive samples ranged from 0 to 90% (mean value 11.1%). 7.3% of samples of groundnuts and groundnut products contained aflatoxin concn. above the tolerances proposed in the Federal Republic of Germany (10 ppb aflatoxin B_1, 20 ppb total aflatoxins). AJDW

61

[Degradation of aflatoxin B_1 by various microorganisms.] Abbau von Aflatoxin B_1 durch verschiedene Mikroorganismen.
Mann, R.; Rehm, H. J.
Zeitschrift fuer Lebensmittel-Untersuchung und -Forschung **163** (1) 39-43 (1977) [27 ref. De, en] [Inst. für Mikrobiol., Univ. Tibusstrasse 7-15, D-4400 Münster/Westfalia, Federal Republic of Germany]

62

Nondestructive distinction between aflatoxin B_1 and ethoxyquin in thin-layer chromatography.
Issaq, H. J.; Barr, E. W.; Zielinski, W. L., Jr.
Journal of Chromatography **132** (1) 115-120 (1977) [24 ref. En] [NCI Frederick Cancer Res. Cent., PO Box B, Frederick, Maryland 21701, USA]

A rapid and simple method is reported for the nondestructive distinction between aflatoxin B_1 and the antioxidant ethoxyquin. They show similar R_f values in certain solvent systems and produce a similar bluish fluorescence under long UV (366 nm) radiation. The method involves in situ generation of fluorescence spectra of the respective TLC spots. At a fixed emission wavelength of 420 nm the fluorescence excitation max. of aflatoxin B_1 was at 366 nm and of ethoxyquin at 348 nm. This method of validating aflatoxin B_1 is simple, conclusive and enhances the validity of levels reported in residue analysis of foods and feeds for this important carcinogen. AL

63

Reversed-phase high-performance liquid chromatographic analytical system for aflatoxins in wines with fluorescence detection.
Takahashi, D. M.
Journal of Chromatography **131**, 147-156 (1977) [19 ref. En] [FDA, 50 United Nations Plaza, San Francisco, California 94102, USA]

An improved procedure using reversed-phase high-performance liquid chromatography (HPLC) with fluorescence detection is described for the analysis of 6 aflatoxins (B_1, B_2, G_1, G_2, B_{2a} and G_{2a}). The method provides greater analytical speed, reproducibility, and resolution, as well as better accuracy and sensitivity than the previously available TLC methods. Aflatoxins B_1 and G_1 were hydrated to enhance their fluorescence response. Analyses of both hydrated and unhydrated compounds by HPLC provided simultaneous qualitative and quantitative information. A typical HPLC run was complete in 15 min. Recoveries of 4 aflatoxins (B_1, B_2, G_1 and G_2) from wines [blackberry, Madeira and pomegranate wines] at the spiked level of 1 μg/l. (1 ppb) were satisfactory. The method as applied to wine samples is sensitive at the 0.02 μg/l. level. AS

64

Examination of papads for filth and aflatoxins.
Northolt, M. D.; McClymont, D. M.; Harwig, J.
Canadian Institute of Food Science and Technology Journal **9** (3) 144-146 (1976) [15 ref. En, fr] [Lab. for Zoonoses & Food Microbiol., Nat. Inst. of Public Health, Bilthoven, Netherlands]

28 samples of papads, Indian pulse flour-based product, imported into Canada were examined for filth, bacteria, moulds and aflatoxins. Water activities (a_w) required for aflatoxin production in papads by Aspergillus parasiticus Speare were also determined. Some papads had moderately high filth levels (insect fragments, hairs, feather barbules) but no aflatoxins were detected. The latter observation was consistent with low mould and total plate counts. Most papads examined provided a favourable substrate for aflatoxin production. At 24°C Asp. parasiticus did not grow at a_w 0.84 but growth and toxin production occurred at a_w 0.87-0.98 with an optimum at 0.98. Some papads allowed rapid growth but little or no aflatoxin production. AS

65

Aflatoxin production on several corn hybrids grown in South Carolina and Florida.
Lillehoj, E. B.; Kwolek, W. F.; Manwiller, A.; DuRant, J. A.; LaPrade, J. C.; Horner, E. S.; Reid, J.; Zuber, M. S.
Crop Science **16** (4) 483-485 (1976) [11 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

Susceptibility of developing ears of several corn hybrids (Zea mays L.) to infection by Aspergillus flavus Link ex Fr. determined by aflatoxin production was studied. 5 experimental single-cross hybrids (SC) adapted for growth in the South and a single-cross hybrid (A) adapted to the Corn Belt were grown in S. Carolina and Florida. Treatments consisted of: (i) periodic spraying with an insecticide to control ear damage by insects; (ii) inoculation of ears with Asp. flavus spores; (iii) mechanical damage of ears to simulate insect damage; and (iv) non-treated controls. Cracked kernels from individual ears were examined for bright greenish-yellow fluorescence (BGY). Shelled corn from each treatment replication was combined, blended, sampled and assayed for aflatoxin. The 5 SC hybrids exhibited a lower level of BGY occurrence and aflatoxin than hybrid A. (ii) increased the incidence of BGY fluorescence and concn. of aflatoxin. Corn from (iv) was extensively contaminated with aflatoxin. (i) reduced but did not eliminate insect damage and toxin development in field corn except for 1 hybrid (SC76 × SC413). The results suggested a relationship between insect damage and presence of the toxin. AS

66

Confirmation of results of rapid screening test for aflatoxins performed at corn elevator.
Shotwell, O. L.; Shannon, G. M.; Goulden, M. L.
Journal of the Association of Official Analytical Chemists **59** (6) 1419-1421 (1976) [6 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

A screening method for corn and corn products, based on a minicolumn, was modified slightly to assay 60 lots of corn at one elevator to determine whether they could be sold as animal feed. To be saleable, the lots had to contain <20 ppb (parts/billion) total aflatoxin. Aflatoxin levels in the lots were later determined by the official AOAC method for corn to check the effectiveness of the screening. No lot had been designated for sale that contained $\gg 20$ ppb total aflatoxin. AS

67

Carbon-13 nuclear magnetic resonance studies of fungal metabolites, aflatoxins and sterigmatocystins.
Cox, R. H.; Cole, R. J.
Journal of Organic Chemistry **42** (1) 112-114 (1977) [12 ref. En] [Chem. Dep., Univ. of Georgia, Athens, Georgia 30602, USA]

^{13}C-NMR has become a valuable tool for identification of carcinogenic fungal metabolites that are widely distributed in human and animal foods. ^{13}C NMR spectra are reported for 12 of the fungal metabolites which contain the fused bihydrofuran ring system and are produced by certain strains of Aspergillus flavus, A. parasiticus and A. versicolor. Included are the aflatoxins B_1, B_2, B_{2a}, B_3 (parasiticol), D_1, G_1, gG_2 and gG_{2a}, and sterigmatocystin and its dihydro, o-methyl and o-methyl dihydro derivatives. Chemical shifts have been assigned on the basis of known substituent effects, off-resonance decoupling experiments and comparison among the related compounds. AS

68

[A synthetic medium for growth and toxin production by Aspergillus flavus.]
Jacquet, J.; Tantaoui-Elaraki, A.
***Bulletin de l'Academie Veterinaire de France* 48** (9/10) 457-466 (1975) [18 ref. Fr]

During the development of a suitable medium that would result in high toxin production by A. flavus, cheese whey and β-galactosidase-hydrolysed whey were tested as possible growth media. Both have lower growth and toxin production than a modified Czapeck-Dox medium. MEG

69

[Aflatoxin and the detection of aflatoxin in food products.]
Vitez, L.; Blinc, M.; Burica, O.; Krasovec, B.
***Hrana i Ishrana* 16** (7/8) 321-328 (1975) [8 ref. Sh, en] [Kemijski Inst. "Boris Kidric", Ljubljana, Yugoslavia]

A method for detection of aflatoxins in foods is described. Aflatoxins are extracted from the food under examination with chloroform in the presence of small quantities of water and kieselguhr. The extract is filtered, the solvent is evaporated off and the residue is taken up in chloroform, and separated by TLC on 'Adsorbsil 1' plates, using a chloroform/acetone/water solvent system; aflatoxin flecks are detected by UV spectrophotometry at 336 nm. This method was applied to detection of aflatoxins in samples of sound and of mould-infected white beans; the results show that aflatoxins B_1, B_2, G_1 and G_2 were present in the mould-infected beans. AJDW

70

Naturally occurring toxicants in foods and their significance. [Lecture]
Munro, I. C.
***Clinical Toxicology* 9** (5) 647-663 (1976) [40 ref. En] [Health Protection Branch, Ottawa, Ontario, Canada]

Naturally occurring toxins include mycotoxins (e.g. ergot alkaloid and aflatoxins), allergens, chemical factors (e.g. nitrosamines, heavy metals) and plant toxins, such as those responsible for lathyrism. The groups are discussed with reference to current toxicological understanding of their occurrence and effects. JRR

71

[Mycotoxins.] [Conference proceedings]
France, Comite Scientifique 'Contamination des Chaines Biologiques'
***Cahiers de Nutrition et de Dietetique* 11** (2, supplement) 120pp. (1976) [many ref. Fr]

The following papers were presented at this conference held in Toulouse on 16-19 Sept. 1975: Mycotoxins: current problems, by C. Frayssinet & P. Lafont (pp. 7-8, Fr); Toxic mycoflora, by J. Payen (pp. 11-15, 28 ref., Fr); Vectors of mycotoxins, by C. Labouche (pp. 17-22, 14 ref., Fr); Ecology of toxinogenic moulds, by J. le Bars (pp. 23-29, 31 ref., Fr); Determination of mycotoxins, by M. Jemmali (pp. 31-35, 13 ref., Fr); Human mycotoxicoses, by P. Lafont & J. Lafont (pp. 39-47, 103 ref., Fr); Suitable tests for detecting the carcinogenic potential of mycotoxins, by Y. Moule, E. Chany & A. Sarasin (pp. 49-58, 56 ref., Fr); Mycotoxins and microorganisms, by J. Lafont, S. Renom de la Baume & P. Lafont (pp. 59-69, 126 ref., Fr); Structure, metabolism and toxicity of the aflatoxins: a review, by D. S. P. Patterson (pp. 71-76, 42 ref., En); Fusarium toxins responsible for leucopenic diseases, by C. Frayssinet & P. Lafont (pp. 77-82, 23 ref., Fr); Toxicological and metabolic considerations of ochratoxin A, by P. Galtier (pp. 83-87, 25 ref., Fr); Production and toxicity of patulin, by L. Escoula (pp. 89-93, 25 ref., Fr); Application of bio-autography for detecting patulin, by R. Capitaine (pp. 95-97, 16 ref., Fr); Reduction of aflatoxin levels in peanuts through agricultural techniques, by A. Bockelee-Morvan & P. Gillier (pp. 101-104, Fr); and Development of methods for eliminating aflatoxins from oilseed products, by A. Prevot (pp. 105-116, Fr). JA

72

A new method for quantitation of aflatoxin in corn. [Lecture]
Seitz, L. M.; Mohr, H. E.
***Cereal Chemistry* 54** (1) 179-183 (1977) [5 ref. En] [US Grain Marketing Res. Cent., USDA, Manhattan, Kansas 66502, USA]

A new method for quantitation of aflatoxin in corn is described which is faster, easier, about one-seventh as expensive, and requires less toxic and/or flammable solvents than AOAC [American Association of Cereal Chemists] Method 1 (CB method). The new method is an extension of a simple screening test previously described [FSTA (1974) 6 12M1661]. Aflatoxin was removed from the corn by double extraction with methanol-water (75/25, v/v). $(NH_4)_2SO_4$ solution was added to a portion of the initial extract, and the resulting aqueous phase was partitioned once with hexane to remove oil and pigments and then twice with methylene chloride to extract aflatoxin. Aspiration was used to remove the hexane (top) layer from the separatory funnel without draining off the aqueous (bottom) layer. Transfer of final extract from one container to another was avoided. Standard TLC was used for final detection and quantitation. When lots of yellow corn 'naturally' contaminated with aflatoxin B_1 were analysed by the new method and by the CB method, results were similar. AS

73

[Growth and toxin formation of Aspergillus flavus on cheese.]

Jacquet, J.; Tantaoui-Elaraki, A.
Comptes Rendus des Seances de l'Academie d'Agriculture de France 62 (3) 208-217 (1976) [27 ref. Fr]

Growth and toxin production of A. flavus was studied in samples of 20 French cheeses obtained on the open market. Tabulated results showed very good growth on fresh and processed cheeses (Boursin, Vache qui Rit) as well as on Emmental, fairly good growth on rindless Coulommiers, goats' milk cheese, and hard cheeses (Boubel, Edam, Gouda, Pyrenean cheese) and no growth on blue cheeses (Bleu d'Auvergne, Roquefort) and soft cheeses (Camembert, Brie, Pont l'Eveque). High toxin production was observed on rindless goats' milk cheese (331 mg aflatoxin B_1/kg), Emmental (107.25 mg/kg) and Gouda (97.50 mg/kg), medium toxin production (26-45 mg/kg) on Boursin, rindless Coulommiers, Bonbel, Pyrenean cheese and Vache qui Rit. The growth occurred mainly in the centre of the cheese. Abundant growth but no toxin formation occurred on Boursin au Poivre, suggesting inhibition of toxigenesis by pepper. Possible reasons for the observations are discussed. RM

74

[The carry-over effect of aflatoxins in the eggs of Japanese dwarf quail (Coturnix coturnix japonica).] Carry-over Effekt von Aflatoxinen bei Eiern japanischer Zwergwachteln (Coturnix coturnix japonica).

Lötzsch, R.; Leistner, L.; Ghosh, M. K.
Fleischwirtschaft 56 (12) 1773-1777 (1976) [35 ref. De, en, fr] [Bundesanstalt für Fleischforschung, Oskar-von-Miller-Strasse 20, 8650 Kulmbach, Federal Republic of Germany]

The carry-over of aflatoxin from the feed to the eggs was studied in Japanese dwarf quails. Hens were provided with rations containing 40-8000 parts/billion aflatoxin B_1 and about 5 times as much G_1 for 30 days, and the residues in whole liquid eggs determined. Detectable residues of B_1 were found at dietary levels >100 parts/billion (ppb), i.e. mean 0.09 ppb, max. 0.5 ppb, rising to mean 1.88 ppb, max. 2.2 ppb at the 8000 ppb level in the diet. At this level, egg production stopped after 10 days. The % carry-over of aflatoxin B_1 from the feed to the eggs fell with concn. from about 0.1% at 100-250 ppb to 0.024% at 8000 ppb. A few detn. of aflatoxin G_1 showed max. residues of 12.5 ppb. Results are discussed in the light of health hazards and proposed total aflatoxin tolerances of 10 ppb in food. RM

75

[Aflatoxin residues in hens' eggs and egg products.] Aflatoxin-Rückstände in Hühnereiern und Eiprodukten.

Lotzsch, R.; Leistner, L.
Fleischwirtschaft 56 (12) 1777-1785 (1976) [many ref. De, en, fr] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

Experiments on carry-over of aflatoxin B_1 and G_1 from the feed to the eggs were done on white and brown HNL hens. Rations were provided containing 40-10 000 parts/billion (ppb) B, 52-13 000 G in ratio 1:1.31 or 1:0.31. No residues were found in liquid whole eggs at dietary levels $<3\,000$ in white hens' eggs B_1 appeared at the 3 000 ppb level, mean concn. 0.03, max. 0.21 in whole egg (0.02 and 0.15 in albumen 0.05 and 0.34 in yolk), rising to 0.11 and 0.43 at 10 000 ppb (0.05 and 0.26 in albumen, 0.23 and 0.79 in yolk); G_1 appeared at 5000 ppb, mean concn. 0.02, max 0.18 (0.02 and 0.15 in albumen, 0.03 and 0.23 in yolk), rising to 0.10 and 0.40 (0.03 and 0.15, 0.24 and 0.90) at 10 000 ppb. Lower residue levels were detected in the eggs of brown hens. The % aflatoxin transmission into eggs was about 0.001% in white and <0.001% in brown eggs. At levels of 10 000 ppb in the feed egg production ceased after a few days, thus excluding high residues in the eggs. Single high oral doses of aflatoxin B_1 produced somewhat higher residues than continuous feeding. Residue levels were reduced by hard boiling or freeze-drying but not by soft boiling, frying or scrambling, and considerably reduced in production of egg powder, especially at >50°C. Results show that tolerance of 40 ppb in the feed should ensure residue-free eggs. RM

76

[Is there a danger of mycotoxins in Hungarian salami? III. Chemical and biological investigations with samples of sliceable salami.] Besteht eine Mykotoxingefahr bei der ungarischen Salami?

Incze, K.; Mihalyi, V.
Fleischwirtschaft 56 (11) 1616-1618 (1976) [15 ref. De, en, fr] [Bundesforschungsanstalt für Ernährung, Engesserstrasse 20, 7500 Karlsruhe, Federal Republic of Germany]

The inhibition of mycotoxin formation during ripening of Hungarian salami by mixed salami flora or Penicillium nalgiovensis was confirmed under conditions simulating production practice. 4-wk-old salami sausages were surface-inoculated with mixed salami flora or P. nalgiovensis and conidial suspensions of toxigenic strains of Aspergillus parasiticus, A. flavus and A. versicolor and allowed to mature for 2 months at 10°-13°C, 80-85% RH. Chemical analysis of 800 samples of sausage skins and contents revealed no aflatoxin, sterigmatocystin, penicillic acid, ochratoxin, patulin or citrinin. Biological tests (chick embryo tests) confirmed the absence of any mycotoxin. [See FSTA (1977) 9 1567 for part II.] RM

77

[Problems with mycotoxins in the meat industry.]

Incze, K.
Husipar 25 (4) 153-158 (1976) [32 ref. Hu, en, de, ru] [Orszagos Husipari Kutatointezet, Gubacsi ut 6/b, 1097 Budapest, Hungary]

78

[Application of high performance liquid chromatography to the quantitative analysis of aflatoxins and mycotoxins in press cakes and by-products.] [Lecture]
Blanc, M.; Midler, O.; Karleskind, A.
Oleagineux **31** (11) 495-499 (1976) [3 ref. Fr, en, es] [Lab. Wolff, 198 rue Sigmund Freud, 75019 Paris, France]

High performance liquid chromatography on silica microparticles (5 µm) gives good resolution of aflatoxins in the order B_1-B_2-G_1-G_2. A simple, quick method for aflatoxin detn. in press cakes was developed, using the chloroform extract without prior purification. The method has a sensitivity of 1 ng, with very good repeatability. Analysis of aflatoxins by high performance liquid chromatography with spectrophotometric detn. at 362 nm was more sensitive and accurate than current TLC and fluorescence analysis methods. The method can also be used for detn. of other mycotoxins e.g. ochratoxin, zearalenone, patulin, aflatoxin M (in milk), and sterigmatocystin. AS

79

[Fungal contamination of food.] Le contaminazioni fungine degli alimenti. [Book]
Cirilli, G.
175pp. (1976) [93 ref. It] Pinerolo, Italy; Chiriotti Editori Price L10 000

This well-illustrated account of fungal contamination of foods contains the following chapters: Basic aspects of mycology and the biology of fungi (pp. 13-38); Culture methods and toxicity tests (pp. 39-53); Mycotoxins (pp. 55-65); Toxigenic fungi (pp. 67-107); Methods for detection and detn. of mycotoxins (pp. 109-124); Symptoms of mycotoxicoses in animals (pp. 125-140); Fungal contamination of various foods (pp. 141-158); Prevention and control of fungal contamination (pp. 159-166); and Yeasts as a source of protein: Toprina (pp. 167-172). AJDW

80

Field desorption mass spectrometry of mycotoxins and mycotoxin mixtures, and its application as a screening technique for foodstuffs.
Sphon, J. A.; Dreifuss, P. A.; Schulten, H.-R.
Journal of the Association of Official Analytical Chemists 60 (1) 73-82 (1977) [12 ref. En] [Div. of Chem. & Physics, FDA, Washington, DC 20204, USA]

The field desorption mass spectra of a variety of mycotoxins were studied. The mycotoxins included the 4 aflatoxins (B_1, B_2, G_1, G_2), rubratoxin B, T-2 toxin, and zearalenone, as well as mixtures of these mycotoxins. The spectra of all the mycotoxins exhibited molecular ions $[M]^+$. Under the conditions employed, only rubratoxin B exhibited major fragmentation. The field desorption technique was applied to the analysis of both spiked and naturally contaminated extracts of foodstuffs [e.g. corn, tomatoes, peanut butter]. The potential of the method as an analytical screening technique for the presence of mycotoxins was evaluated. AS

81

Temperature limits for production of aflatoxin by twenty-five isolates of Aspergillus flavus and Aspergillus parasiticus.
Schindler, A. F.
Journal of Food Protection 40 (1) 39-40 (1977) [11 ref. En] [Div. of Microbiol., FDA, Dep. of Health, Education & Welfare, Washington, DC 20204, USA]

Aflatoxicogenic isolates of Aspergillus were tested for their aflatoxin production after 8 wk of growth on wort agar medium at high (41 and 46 ± 1°C) and low (2 and 7 ± 0.5°C) temp. Controls were grown at approx. 22°C, a temp. known to be favourable for aflatoxin production. There were 2 replications of each treatment. All replicate cultures of the 25 isolates grown at 22°C were positive for aflatoxin. Aflatoxins were not detected in wort agar when cultures were incubated at other test temp. It appears that both Asp. flavus and Asp. parasiticus will not produce aflatoxins when grown at $<$7.5°C or at $>$40°C. AS

82

Mass spectral confirmation of aflatoxins.
Haddon, W. F.; Masri, M. S.; Randall, V. G.; Elsken, R. H.; Meneghelli, B. J.
Journal of the Association of Official Analytical Chemists 60 (1) 107-113 (1977) [27 ref. En] [W. Regional Res. Cent., USDA, Berkeley, California 94710, USA]

2 methods for mass spectral (MS) confirmation of aflatoxins in agricultural products and in physiological fluids are described. In the first, electron ionization (EI) mass spectra are obtained following isolation by TLC and compared with available reference mass spectra to provide structural confirmation. Extensive sample clean-up is required for confirmation at the 10-1000 parts/billion level and min. sample size is 10-50 ng aflatoxin isolated by TLC. The second method restricts MS scanning to particular ions which are characteristic of the suspected aflatoxins and requires spectrometer resolution above 5000. The latter method, called high resolution selected ion monitoring (HRSIM) has a sensitivity below 0.0001 µg for aflatoxin B_1 and makes possible direct analysis of complex mixtures. Employing HRSIM analysis on complex mixtures lowers the detection limit for aflatoxin M_1 and B_1 by 100-fold or more below the limit for highly purified samples. This dramatic sensitivity enhancement is attributed to a reduction in surface bonding between the aflatoxins and the glass sample containers used to introduce the samples. The HRSIM is generally applicable to compounds that cannot be separated by gas chromatography prior to MS analysis. AS

83

Significance of aflatoxins in foods. [Lecture]
Goldblatt, L. A.
Association of Food and Drug Officials, Quarterly Bulletin 40 (4) 191-201 (1976) [14 ref. En] [Mycotoxin Analytical Lab., FDA, Dep. of Health Education & Welfare, 423 Canal Street, New Orleans, Louisiana 70130, USA]

The discovery and characterization of aflatoxins are discussed, with reference to biological effects and the chemical structures of the toxins. Analytical methodology, involving TLC of purified extracts, and measurement of fluorescence intensity, under UV illumination, with a densitometer is briefly described, and the difficulties of monitoring the incidence of aflatoxin contamination of foods are discussed. JRR

84

Study of an epidemic of jaundice, presumably due to toxic hepatitis, in Northwest India.
Tandon, B. N.; Krishnamurthy, L.; Koshy, A.; Tandon, H. D.; Ramalingaswami, V.; Bhandari, J. R.; Mathur, M. M.; Mathur, P. D.
Gastroenterology 72 (3) 488-494 (1977) [27 ref. En] [All-India Inst. of Med. Sci., New Delhi, India]

An epidemic of jaundice probably due to toxic hepatitis occurred in 3 adjoining districts of Northwest India during Nov-Dec. 1974. Dogs were affected first, then humans. Detailed clinical features, appropriate laboratory tests, and liver biopsies were studied. A retrospective epidemiological survey was carried out. The disease had a subacute onset starting with high fever, followed by rapid progressive jaundice. Ascites appeared simultaneously and soon became quite massive. Hepatomegaly was recorded when ascites decreased. Liver function tests suggested cholestatic jaundice. Aetiology of this epidemic of hepatitis could not be unequivocally established. Critical analysis of data suggested that some food toxin may have been a factor in this unusual epidemic of toxic hepatitis; mouldy maize samples obtained from affected and control families contained high concn. of aflatoxin B_1. JA

85

High performance liquid chromatography of aflatoxins in cottonseed products.
Pons, W. A., Jr.; Franz, A. O., Jr.
Journal of the Association of Official Analytical Chemists 60 (1) 89-95 (1977) [12 ref. En] [S. Regional Res. Cent., USDA, New Orleans, Louisiana 70179, USA]

A precise and sensitive high performance liquid chromatographic (HPLC) method is proposed for determining aflatoxins in cottonseed products [meats and meals] in 1.0-1.5 h. After aqueous acetone extraction, lead acetate treatment, and partition of aflatoxins into methylene chloride, sample extracts are purified on a small silica gel column requiring only 125 ml solvent/sample. Aflatoxins B_1 and B_2 in the purified extract are resolved on a micro particulate (10 µm) silica gel column in approx. 8 min, using a water-saturated chloroform-cyclohexane-acetonitrile solvent, with detection by UV absorbance at 365 nm. The resolution was highly reproducible, giving coeff. of variation of 0.2-1.0% for retention and 1.0-2.3% for quantitation. Recovery of added aflatoxins B_1 and B_2 was 90-95% at levels of 5-100 µg/kg. The within-laboratory coeff. of variation of the entire method, based on repetitive assays of a cottonseed meal (34 µg B_1/kg, 6 µg B_2/kg), were 7.3% (B_1) and 7.4% (B_2). A high degree of correlation was obtained for HPLC estimation by 2 different commercial columns; for quantitation by peak height vs. electronic integration; and for quantitation by HPLC or TLC. AS

86

Estimation of the fungal toxins, zearalenone and aflatoxin, contaminating opaque maize in Zambia.
Lovelace, C. E. A.; Nyathi, C. B.
Journal of the Science of Food and Agriculture 28 (3) 288-292 (1977) [23 ref. En] [Dep. of Chem. & Biochem., Univ. of Zambia, PO Box 2379, Lusaka, Zambia]

The concn. of zearalenone and aflatoxin was estimated in Zambian home-brewed and commercial opaque maize beer. Levels of aflatoxin were negligible. Zearalenone was present at $\leqslant$4.6 mg/l. with a mean concn. of 0.92 mg/l. Zearalenone was detected in the maize and maize malt used in beer preparation and it was found to dissolve preferentially in the liquid fraction of the beer. The concn. was related to the district of maize growth. AS

87

Bean and other dried legume varieties as substrates for the production of mycotoxins.
Schindler, A. F.; Abadie, A. N.
Abstracts of the Annual Meeting of the American Society for Microbiology 76, 180 (1976) [En] [FDA, Washington, DC, USA]

Previous studies have shown mycotoxin-producing species (Aspergillus flavus, Asp. versicolor, Asp. ochraceus, Penicillium citrinum, P. cyclopium, and P. urticae) in the mould profiles of dried beans. This finding stimulated the question as to whether beans would support extensive mould growth and mycotoxin production if exposed to moisture during storage. Dried legumes were inoculated with selected mycotoxin-producing mould spp. under conditions favourable for mould growth. After varying times of incubation the beans were chemically extracted, the extracts spotted on TLC plates and mycotoxins quantitatively determined. Pinto, black eye peas, split peas, Great Northern, navy, lentils, baby lima, garbanzo, cow peas, soybeans and pink kidney beans were found to be suitable, in varying degrees, as substrates for the production of aflatoxins B_1, G_1 and M_1 and sterigmatocystin. AS

88

[Characteristics of some microfungi present in cocoa.]
Falkowski, J.; Jakubowska, B.; Siwicka, H.; Sozynski, J.; Warzecha, A.
Zeszyty Naukowe, Akademia Rolnicza w Szczecinie No. 50 (Rolnictwo, XIII) 149-164 (1975) [39 ref. Pl, de, ru] [Inst. Chemii i Przechowalnictwa, AR, Szczecin, Poland]

100-g packaged samples of cocoa (16% fat) from 4 factories ((i)-(iv)) were obtained at random from the Szczecin market 5 × every 2.5 months during 1972/1973. Each sample was examined in triplicate. Incidence of fungi spores was 80-150/g in (i) and (iv) samples and 10-30/g in (ii) and (iii) samples. In all, 243 strains of fungi were isolated belonging to the following genera: Aspergillus (53.3%), Penicillium (24.2%), Mucor (15.3%), Rhizopus (2.4%), Scopulariopsis (2.0%), Alternaria (1.7%), Chrysosporium (0.8%) and Cladosporium (0.4%). 17 of the 129 strains of Aspergillus produced toxins on synthetic media; 14 (identified as Asp. flavus and Asp. parasiticus) produced aflatoxins B_1 and B_2, and 3 produced unidentified toxins. The aflatoxin quantities produced ranged from traces to 556 µg/50 ml medium. SKK

89

Fungal growth and aflatoxin production on apiarian substrates.
Hilldrup, J. A. L.; Eadie, T.; Llewellyn, G. C.
Journal of the Association of Official Analytical Chemists 60 (1) 96-99 (1977) [25 ref. En] [Dep. of Biol., Virginia Commonwealth Univ., Richmond, Virginia 23284, USA]

Unprocessed honey, Lilium longiflorium pollen, brood comb, whole larvae, and whole bees were inoculated with Aspergillus flavus NRRL 3251, A. flavus ATCC 15548, and A. parasiticus NRRL 2999. The fungi grew, sporulated, and produced various amounts of aflatoxin on all substrates except the unprocessed honey. Apiarian substrates, with the exception of honey, seem capable of supporting fungal growth and resultant aflatoxin production. AS

90

Aflatoxin: comparison of analyses of corn by various methods.
Shotwell, O. L.; Goulden, M. L.
Journal of the Association of Official Analytical Chemists 60 (1) 83-88 (1977) [5 ref. En] [N. Regional Res. Lab., USDA, Peoria, Illinois 61604, USA]

2 methods were evaluated for determining levels of aflatoxin: one developed for peanuts and peanut products (BF method); the other (Pons method) for cottonseed products. Both were applied to corn, and results were compared with those obtained with the AOAC official first action CB method adopted for corn. Recoveries were much lower with the BF method than with the official AOAC method. Recoveries of aflatoxin B_1 with the Pons method were satisfactory in samples containing <50 µg aflatoxin B_1/kg, but only about 50% for samples spiked at 50 and 100 µg/kg; however, no aflatoxin G was detected in naturally contaminated corn, whereas G aflatoxins were detected with the CB method. Reducing the amounts of solvents used in the official AOAC method was also studied. The extraction solvent, chloroform, could be decreased from 250 ml to 150 ml, and washing and eluting solvents for column chromatography could be reduced by half without affecting results in this study. AS

91

Aflatoxin and Aspergillus flavus in 1975 corn at harvest from specific regions of Iowa.
Lillehoj, E. B.; Fennell, D. I.; Kwolek, W. F.
Abstracts of the Annual Meeting of the American Society for Microbiology 76, 180 (1976) [En] [N. Regional Res. Lab., USDA, Peoria, Illinois, USA]

Freshly harvested corn from west central and central Iowa was examined for the field occurrence of aflatoxin. During the latter part of Oct., 214 samples of shelled corn were collected at random; samples were dried to 13% moisture within 4-156 h after harvest. Bright greenish-yellow (BGY) fluorescence was observed in 47% of samples after coarse grinding. Aflatoxin B_1 was detected in 37 (17%) of the 214 test units. However, only 4 (2%) contained the toxin at levels >20 parts/billion (ppb). The highest toxin level found was 56.5 ppb. No difference in aflatoxin incidence was observed between samples collected in west central and central regions. Samples from 2 collection dates in west central Iowa were examined for kernels internally infected with Asp. flavus. The incidence of samples containing the fungus ranged from 42% to 93%. Aflatoxin contamination of specific samples was associated with the presence of Asp. flavus. However, many samples of corn contained the fungus with no detectable toxin. A visual examination was made for Asp. flavus-infected ears on standing stalks. A number of ears exhibiting characteristic greenish-yellow spores were collected; corn from these ears contained aflatoxin B_1 at levels ranging from 1.2 to 1560.9 ppb. AS

92

Comparison of three culture media for the detection of aflatoxin forming strains of Aspergillus flavus in bread.
Reiss, J.
Zentralblatt fuer Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, IB 163 (5/6) 536-539 (1976) [9 ref. En, de] [Mikrobiol. Lab. der Grahamhaus Studt KG, D-6550 Bad Kreuznach, Federal Republic of Germany]

A comparative study was conducted to evaluate the suitability of 3 media for detection of toxigenic strains of Aspergillus flavus in bread. The media tested were: Bothast & Fennel's medium [see FSTA (1974) 6 9M1267]; the medium of Hara et al. [Applied Microbiology (1974) 27, 1118-1123]; and

Reiss's medium [FSTA (1972) 4 10M1061]. 8 strains of fungi commonly occurring on bread (Aspergillus flavus, Asp. oryzae, Asp. niger, Asp. versicolor, Cladosporium herbarum, Penicillium expansum, Mucor spinosus, Neurospora crassa) were inoculated onto whole wheat bread, which was placed on the media under test and incubated for 10 days at 28°C in the dark. Presence of aflatoxins was determined by TLC. A table of results is given. Only Asp. flavus produced aflatoxins in the bread or the media under test. Asp. flavus grew well and sporulated heavily on Reiss's medium; however, differences in growth intensity between Asp. flavus and the other fungi were insufficient for acceptable differentiation. Both of the other 2 media are suitable for screening for toxigenic Asp. flavus in bread; Bothast & Fennel's medium is recommended, because of its simplicity of preparation and handling. AJDW

93

Secalonic acids D and F are toxic metabolites of Aspergillus aculeatus.

Anderson, R.; Büchi, G.; Kobbe, B.; Demain, A. L.

Journal of Organic Chemistry 42 (2) 352-353 (1977) [15 ref. En] [Dep. of Chem., Massachusetts Inst. of Tech., Cambridge, Massachusetts 02139, USA]

The chemical identification, preparation and biological activity of secalonic acids D and F, produced by Asp. aculeatus Fizuka grown on white corn, are reported. Both showed antimicrobial activity against Bacillus megaterium, secalonic acid F being somewhat less active than secalonic acid D. RM

94

Four new mycotoxins of Aspergillus clavatus related to tryptoquivaline.

Büchi, G.; Kin Chun Luk; Kobbe, B.; Townsend, J. M.

Journal of Organic Chemistry 42 (2) 244-246 (1977) [12 ref. En] [Dep. of Chem., Massachusetts Inst. of Tech., Cambridge, Massachusetts 02139, USA]

The hydroxylamine nortryptoquivaline and 3 secondary amines (deoxytryptoquivaline, deoxynortryptoquivaline and deoxynortryptoquivalone) were found to be toxic metabolites of Asp. clavatus (strain MIT-M-18) isolated from mould-infested rice obtained from a Thai household where a child had died of an unidentified toxicosis. These compounds were accompanied by 2 previously described tremor-producing agents (tryptoquivaline and nortryptoquivalone). None of the 4 first-named compounds had activity against the mycotoxin assay organism Bacillus megaterium. RM

95

Aflatoxin and Aspergillus flavus occurrence in 1975 corn at harvest from a limited region of Iowa.

Lillehoj, E. B.; Fennell, D. I.; Kwolek, W. F.

Cereal Chemistry 54 (2) 366-372 (1977) [18 ref. En] [N. Regional Res. Cent., USDA, Peoria, Illinois 61604, USA]

Freshly harvested corn (18.4% moisture average) from the 1975 crop was examined for Asp. flavus Link ex Fr., bright greenish-yellow (BGY) fluorescence, and aflatoxin. The survey was in 3 counties of west central Iowa and in 1 centrally located county. In all, 214 samples of shelled corn were collected and dried to $<13\%$ moisture within 4-156 h after harvest. About ⅓ of the samples exhibited BGY fluorescence in cracked fractions, and 17% contained detectable levels of toxin. However, only 4 samples had aflatoxin B_1 levels >20 ppb [parts/billion], with the highest concn. at 56 ppb. Visual examination of ears on standing stalks was carried out in 8 fields; 11 ears with greenish-yellow spores were found. Corn from these ears was contaminated with toxin at levels ranging from 1 to 1560 ppb. AS

96

[Determination and occurrence of aflatoxin M_1 and B_1 in milk and dairy produce.] Bestimmung und Vorkommen von Aflatoxin M_1 und B_1 in Milch und Milchprodukten.

Fritz, W.; Donath, R.; Engst, R.

Nahrung 21 (1) 79-84 (1977) [21 ref. De, en, ru] [Zentralinst. für Ernährung, Potsdam-Rehbrücke, German Democratic Republic]

A method for simultaneous identification and detn. of aflatoxins M_1 and B_1 in milk is described. A chloroform extract of the milk or milk product is separated by 2-dimensional TLC on Kieselgel G using ether:methanol:water (94:4.5:1.5) and chloroform:acetone:methanol (90:10:2) as developing solvents. The plates are scanned at 364 and 434 nm with an automatic recording spectrophotometer fitted with a TLC attachment. The detection limit is about 0.1 µg aflatoxin/kg liquid milk and 0.5 µg/kg dried milk. Out of 24 samples of commercial winter milk tested, 4 contained 1.7, 2.7, 3.5 and 6.5 µg aflatoxin M_1/kg; no aflatoxin B_1 or M_1 was detected in 12 samples of summer milk. Analysis of 18 dried milks and infant foods showed that only 1 sample (Ki-Na infant food) contained aflatoxin B_1 (6.4 µg/kg). IN

97

Comparison of two methods for analysis of aflatoxin M_1 in milk.

Bodine, A. B.; Davis, R. W.; Janzen, J. J.; Crawford, F. M.

Journal of Dairy Science 60 (3) 450-452 (1977) [15 ref. En] [Dep. of Dairy Sci., Clemson Univ., Clemson, S. Carolina 29631, USA]

A Holstein-Friesian cow was given 1.25 mg aflatoxin B_1/day for 7 days. The aflatoxin B_1 was mixed with concentrates (at a rate of 250 μg/kg) and administered by means of a bolus gun. Milk samples, collected during the 10 days after aflatoxin B_1 was first fed, were analysed for aflatoxin M_1, using (i) the AOAC method [see FSTA (1974) 6 4P449] and (ii) a 2-dimensional TLC procedure [see FSTA (1976) 8 1P159]. Aflatoxin M_1 contents reached a max. on days 5-7, when method (i) gave values of 0.20-0.22 μg/l. and method (ii) 0.21-0.25 μg/l.; by day 10 the values had decreased to <0.01 μg/l. by method (i) and 0.008-0.010 μg/l. by (ii). Each method consistently gave recoveries >87% over the range 0.0125-0.200 μg aflatoxin M_1/l., and there was no significant difference between the mean % recovery or the variance of either method. The increased sensitivity of (ii) (0.005 μg aflatoxin M_1/l. vs. 0.01 μg/l. for (ii) makes it a possible alternative to the more time consuming AOAC method (i). MEG

98

[Determination of aflatoxins in milk and milk products.] Aflatoxinbestimmung in Milch und Milchprodukten.
Polzhofer, K.
Zeitschrift fuer Lebensmittel-Untersuchung und -Forschung 163 (3) 175-177 (1977) [19 ref. De, en] [Unilever Forschungsgesellschaft mbH, Behringstrasse 154, D-2000 Hamburg 50, Federal Republic of Germany]

During the period from September 1972 to December 1974, 260 samples of milk, 41 of dried milk, 54 of yoghurt, 80 of fresh cheese, 65 Camembert, 77 of hard cheese and 134 of processed cheese were investigated for their contents of aflatoxin B_1, B_2, G_1, G_2 and M_1. In all products containing toxin only aflatoxin M_1 could be detected. Aflatoxin M_1 levels ranged from (with mean values in parentheses): 0.05 to 0.33 μg/l. (0.07) in milk; 0.2 to 2.0 μg/kg (0.50) in dried milk; 0.05 to 0.47 μg/kg (0.20) in yoghurt; 0.10 to 0.51 μg/ka (0.23) in fresh cheese; 0.10 to 1.30 μg/kg (0.43) in hard cheese; 0.1 to 0.55 μg/kg (0.26) in processed cheese; and 0.1 to 0.73 μg/kg (0.31) in Camembert. LMB

99

[Whey-based fish meal-free fish food.] Fischmehlfreies Fischfutter auf Molkenbasis.
Meske, C.; Ney, K. H.; Pruss, H. D.
Fortschritte in der Tierphysiologie und Tierernaehrung No. 8, 56-70 (1977) [21 ref. De, en] [Bundesforschungsanstalt für Fischerei, Aussenstelle Ahrensburg der Inst. für Küsten- & Binnenfischerei, D-2070 Ahrensburg, Federal Republic of Germany]

Comparative feeding trials with silver carp (Hypophthalmichthys molitrix) and grass carp (Ctenopharyngodon idella) are described, in which whey-based diets were compared with commercial fish foods. Feeding liquid whey or dried whey alone gave poor results (no wt. gain); a soybean meal/acid whey powder/fat (4:5:1) diet supplemented with methionine, lysine and a trace element mixture gave wt. gains at least equal to those achieved with a commercial feed. Muscle tissue samples from carp fed the above soybean meal/acid whey powder/fat diet or 3 commercial diets were analysed for heavy metals, aflatoxins and organochlorine compounds. Tables of results are given. Samples from carp fed the whey-based diet contained approx. 0.1 ppm Hg and 0.07 ppm Pb, vs. 0.09-0.17 ppm Hg and 0.03-0.05 ppm Pb for those from carp fed commercial diets. No aflatoxins were detected in any sample. Muscle tissue from carp fed the commercial diets contained polychlorinated biphenyls, DDD, DDE and traces of dieldrin; samples from fish fed the whey-based diet contained polychlorinated biphenyls plus traces of hexachlorobenzene. Residue concn. in all samples were well within legal limits. Taste panel studies showed fish fed the whey-based diet to be preferred (because of their tender, lean, white meat, and absence of any musty flavour). AJDW

100

Studies on the mycoflora of biltong.
Riet, W. B. van der
South African Food Review 3 (1) 105, 107, 109, 111 (1976) [33 ref. En]

Mould spoilage and formation of mycotoxins on biltong are a major problem in the South African meat industry. 20 samples of biltong, including 11 samples of stick biltong, 6 of packaged, sliced biltong and 3 of game biltong were examined for total mould counts, total yeast counts, NaCl content, moisture content, a_w, pH and production of aflatoxins on biltong in relation to a_w and atmospheric RH. Tabulated data are given. The mould and yeast counts respectively varied between <10 and 1.9 × 10^5/g and <10 and 3.0 respectively. These counts were not related to the NaCl content, moisture content or a_w values. Approx. 55% of the mould isolates were members of the genus Aspergillus and 13% were from the genus Penicillium. The most frequently isolated yeasts were Torulaspora hansenii, Candida zeylanoides and Trichosporon cuteneum. Of a total of 26 strains of Aspergillus flavus, 16 were found to produce aflatoxins B_1 and B_2 on synthetic media; aflatoxin synthesis continued until mycelial growth was arrested at a_w 0.88. Growth as well as aflatoxin production occurred at RH 85% but not at RH 80%. Other mycotoxin producing fungi were also isolated. Toxin production can be avoided by hygienic manufacture, lowering the a_w to <0.70 and the application of preservatives. GL

101

Use of fluorescence detection in high-performance liquid chromatography.
Johnson, E.; Abu-Shumays, A.; Abbott, S. R.
Journal of Chromatography 134 (1) 107-119 (1977) [25 ref. En] [Varian Instrument Div., 611 Hansen Way, Palo Alto, California 94303, USA]

The optical design of a fluorescence detector specially designed for high-performance liquid chromatography is described, and examples of its sensitivity are presented, e.g. for presence of polynuclear aromatics in tap water, and detn. of aflatoxins. AL

102

[Research into toxic metabolites of fungi.] [Review]
Niku-Paavola, M.-L.; Nummi, M.
Kemia-Kemi 4 (4) 151-153 (1977) [18 ref. Fi, en] [Valtion Teknillinen Tutkimuskeskus, Biotekniikan Lab., Helsinki, Finland]

The structure, toxic effects and methods for analysis of mycotoxins are reviewed. Studies carried out in Finland of mycotoxins in grain are reported, the aim of the investigations being to develop a simple method for determining mycotoxins in grain and fodder. Results indicated that Fusarium and Stachybotrys spp. occur widely in grain and that most species form toxins under laboratory conditions. Fusarium spp. produce the following toxins: F2, T2, HT2, neosolaniol. A TLC method was developed for quantitatively determining these 4 toxins. [From En summ.] JA

103

Mycotoxicosis produced in mice by cultural products of an isolate of Aspergillus ochraceus.
Zimmermann, J. L.; Carlton, W. W.
Food and Cosmetics Toxicology **14** (6) 571-575 (1976) [40 ref. En] [Dep. of Vet. Microbiol. & Path., School of Vet. Med., Purdue Univ., W. Lafayette, Indiana 47907, USA]

Rice culture was fed at a dietary concn. of 5, 7.5, 9, 10, 25 and 50% to groups of 15 male and 15 female Swiss albino mice. Ground fungal mats of A. ochraceus were fed at a dietary concn. of 1, 2 or 3% to similar groups of 30 mice. Autopsy was performed on the mice that died and or those killed when moribund or when the experiments were terminated after 3 wk of feeding. In groups fed the fungal-mat diet, body-wt. gains were markedly reduced and in those fed the highest concn. approx. ⅓ the mice died. Nearly all the mice fed the rice-culture diet had died by the third wk of feeding. The 3-wk LD_{50} was about 7.0% for both sexes of mice fed the rice culture and 2.3% for those fed the fungal mats. Gross lesions with both types of diet included jaundice, greenish discoloration of the kidneys and focal necrosis in the liver. The cultures have been shown to be negative for aflatoxin, ochratoxin A, citrinin and penicillic acid. It seems likely that this strain of A. ochraceus produces an as yet unidentified toxin and that the toxin may be similar chemically to that produced by the isolates of Penicillium viridicatum. VJG

104

Differential pulse polarographic determination of aflatoxins in culture filtrates and foodstuffs.
Lawellin, D. W.; Osteryoung, J.; Grant, D. W.; Whittaker, J.
Abstracts of Papers, American Chemical Society **173**, ANAL 176 (1977) [En] [Dep. of Microbiol., Colorado State Univ., Fort Collins, Colorado 80523, USA]

Use of differential pulse polarography (DPP) simplifies the identification and quantification of aflatoxins B and G from a variety of foodstuffs, e.g. milk, rice, corn. Culture filtrates or growth substrates are homogenized with H_2O:methanol (1:1), extracted twice with n-butanol and 3 times with chloroform. The solvents are pooled and flush evaporated. The residue is washed 3 times each with petroleum ether and H_2O to remove electroactive interferences. The remaining residue is dissolved in methanol and the aflatoxin content determined by TLC and DPP. Good agreement is obtained between TLC and DPP results. AS

105

Effect of aflatoxin B_1, ochratoxin A and rubratoxin B on infant rats.
Hayes, A. W.; Cain, J. A.; Moore, B. G.
Food and Cosmetics Toxicology **15** (1) 23-27 (1977) [24 ref. En] [Dep. of Pharm. & Toxicol., Univ. of Mississippi Med. Cent., Jackson, Mississippi 39216, USA]

Investigations were carried out to determine whether the neonate is more susceptible than the adult to each toxin and whether neonatal exposure leads to abnormal manifestations in the weanling or makes the animal more susceptible to a second mycotoxin given at the same time or several days later. Oral LD_{50} values were determined in 24-h-old Sprague-Dawley rats for aflatoxin B_1 (1.36 mg/kg), ochratoxin A (3.90 mg/kg) and rubratoxin B (6.38 mg/kg). Compared with the oral LD_{50} values in adults, the neonates showed an increased susceptibility to each mycotoxin. A synergistic response was not demonstrated when aflatoxin B_1 was given on day 1 followed by rubratoxin B on day 15 or in experiments using ochratoxin followed by rubratoxin. VJG

106

[Determination of aflatoxins in food products.]
Galea, V.; Bara, A.
Igiena 25 (2) 123-128 (1976) [12 ref. Ro, en, ru] [Inst. Oncologic, Cluj-Napoca, Romania]

Numerous samples of foods were tested for aflatoxins by TLC; tables of results are given showing the number of samples containing aflatoxins B_1, B_2, G_1, G_2 and (where appropriate) M_1. 6 of 34 cheese samples contained aflatoxins (B_1, G_1, G_2 and M_1); most of the aflatoxin-containing samples showed traces of mould. 8 of 52 samples of flour, bread, etc. contained aflatoxins (B_1, G_1 and G_2); most aflatoxin-positive samples had been held in plastics bags. Only 1 sample (plum residues for distillation) of 29 samples of fruit and fruit products contained aflatoxin (type B_1). No aflatoxins were detected in a total of 17 samples of beer and its raw materials. AJDW

107

Production of aflatoxin B_1 and G_1 by Aspergillus parasiticus on silica gels.

Torrey, G. S.; Marth, E. H.

Zeitschrift fuer Lebensmittel-Untersuchung und -Forschung **163** (4) 264-267 (1977) [7 ref. En, de] [Dep. of Food Sci., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

108

[Detection of aflatoxins in decorticated soybeans and soya flour.]

Preda, N.

Igiena **25** (4) 345-350 (1976) [15 ref. Ro, en, ru] [Lab. de Toxicologie, IMF Cluj-Napoca, Romania]

Methods for detection of aflatoxins in soybeans and soy flour are discussed, with reference to: isolation, culture and identification of toxigenic strains of aspergilli; extraction of aflatoxins; TLC separation; and identification of aflatoxin flecks on thin layer chromatograms by UV fluorescence or by means of specific reagents. AJDW

109

[Spectrofluorometric method for determination of aflatoxins in groundnuts.]

Czerwiecki, L.

Roczniki Panstwowego Zakladu Higieny **27** (6) 621-627 (1976) [18 ref. Pl, ru, en] [Zaklad Higieny, Warsaw, Poland]

A spectrofluorometric method is described for quantitative detn. of aflatoxins B_1, B_2, G_1 and G_2 in groundnuts. Aflatoxins were extracted with an 80:20 mixture of acetone and water. The extracts were purified with a 20% solution of lead acetate and then on an aluminium oxide column. After chromatographic separation of the aflatoxins on a thin-layer plate, the gel areas fluorescing in UV light were eluted with ethanol. The intensity of the fluorescence was measured with an Aminco-Bowman spectrofluorimeter. The content of aflatoxins was determined on the basis of standard curves in ethanol. The detectability of aflatoxins B_1, B_2, G_1 and G_2 was respectively 5.0, 2.0, 3.0 and 0.5 µg/kg. AS

110

Corn earworm damage and aflatoxin B_1 on corn ears protected with insecticide.

Widstrom, N. W.; Lillehoj, E. B.; Sparks, A. N.; Kwolek, W. F.

Journal of Economic Entomology **69** (5) 677-679 (1976) [7 ref. En] [S. Grain Insects Res. Lab., USDA, Tifron, Georgia 31794, USA]

The relationship between infection of 4 dent corn hybrids with corn earworm (Heliothis zea Boddie), infestation with Aspergillus flavus Link ex. Fries and production of aflatoxin B_1 was investigated by comparing natural and artificial infestation with earworm and Asp. flavus; the effects of stirofos insecticide applied by spray and in treated bags were also considered. No significant correlation was found between earworm damage and aflatoxin B_1 concn., and the insecticide did not entirely control insect damage or aflatoxin accumulation. JRR

111

Improved procedure for quantitative determination of aflatoxins in corn and wet milled corn products.

Barabolak, R.

Journal of the Association of Official Analytical Chemists **60** (2) 308-310 (1977) [8 ref. En] [Moffett Tech. Cent., CPC Int. Inc., Argo, Illinois 60501, USA]

Aflatoxins are extracted from the sample by high-speed blending with aqueous acetone, purified with $(NH_4)_2SO_4$, and partitioned into benzene. The benzene extract is purified on a silica gel/alumina column by washing with benzene/acetic acid and ether/hexane, and eluted with methylene chloride/acetone. The eluate is evaporated, redissolved in benzene/acetonitrile, and spotted on a TLC plate for resolution and quantitative detn. against standards. AS

112

Spectral analyses of fluorescence in dent maize infected with Aspergillus flavus and Aspergillus parasiticus.

Rambo, G. W.; Zachariah, G.; Parente, A.; Tuite, J.

Journal of Stored Products Research **12** (4) 229-234 (1976) [12 ref. En] [Dep. of Bot. & Plant Path., Purdue Univ., W. Lafayette, Indiana 47907, USA]

Yellow dent maize of 2 var. was inoculated with Asp. flavus or Asp. parasiticus and stored at various moisture contents and temp. in static and aerated systems [see FSTA (1976) 8 4M528]. Samples examined after 3-14 days storage showed bright greenish yellow (BGYF) and blue white (BWF) fluorescences with peak wavelengths at 480-485 nm (BGYF) and 440-445 nm (BWF), which did not vary with storage conditions. BWF was similar spectrally to the fluorescence of the endosperm of sound kernels, but 5-20 times more intense. The spectrum of BWF was similar to that of aflatoxin G_1 or a mixture of B_1, B_2, G_1 and G_2 spotted on endosperm. BGYF of test samples was spectrally similar to fluorescence from a commercial grain sample and a colour standard (Tiponal BV). Amsoy soybeans without seed coat fluoresced with a peak at 470-475 nm but the intensity was low compared with BGYF in maize. A 'false BGYF' was obtained with cobs and kernels of uninfected yellow and white dent maize containing no aflatoxin. The relevance of these findings to automatic optical screening for aflatoxin is discussed. RM

113

Aspergillus flavus and aflatoxin production in acid-treated maize.

Bothast, R. J.; Goulden, M. L.; Shotwell, O. L.; Hesseltine, C. W.

Journal of Stored Products Research **12** (3) 177-183 (1976) [15 ref. En] [N. Regional Res. Lab., USDA Peoria, Illinois 61604, USA]

1.5% isobutyric acid (IBA) or 1.2% propionic-acetic acid (PA) were applied to comparable 52.8 m³ lots of freshly harvested yellow dent maize containing 27% moisture. After 6 months storage, 30% Asp. flavus infection and low levels of aflatoxin

were detected in adjacent bins of IBA- and PA-treated maize. Extensive samples taken after 7 months from mouldy spots revealed 10^6 Asp. flavus/g in 40% of PA-treated samples (but no aflatoxin) as well as high counts of Asp. fumigatus, absidia and penicillia. These moulds, as well as Asp. niger, were found on IBA-treated maize, with 10^4-10^7 Asp. flavus/g in 79% and 2-857 ng aflatoxin/g in 57% of IBA-treated samples. Aflatoxin contamination varied between locations within a mouldy area, e.g. from 150 to 21 800 ng/g in aflatoxin positive kernels among 20 individual kernels picked at random from each location.
RM

114

[Some aspects of aflatoxin formation during self-heating of cereals.] Einige Aspekte zur Frage der Aflatoxinbildung im Verlaufe der Selbsterhitzung des Getreides.

Spicher, G.
Muehle + Mischfuttertechnik 114 (9) 113-116 (1977) [7 ref. De, en, es, fr] [Bundesforschungsanstalt für Getreide- & Kartoffelverarbeitung, Detmold, Federal Republic of Germany]

The effect of self-heating of stored grain on the formation of ecological niches favouring the growth of toxigenic mould (Aspergillus flavus) was studied. Batches of grain containing 16, 18 and 20% moisture and already contaminated by moulds were inoculated with Asp. flavus and monitored for changes in microflora, temp. and chemical characteristics for 30 days. Results are shown graphically. Little aflatoxin formation was observed when mould growth was associated with self-heating. It seems that with self-heating the optimum temp. range for Asp. flavus was quickly exceeded and aflatoxin production arrested. It is concluded that mycotoxin production is of greater significance with superficial mould than with internal mouldy pockets. RM

115

Aflatoxin contamination of village milk in Isfahan, Iran.
Suzangar, M.; Emami, A.; Barnett, R.
Tropical Science 18 (3) 155-159 (1976) [12 ref. En, fr, es] [Regional Mycotoxin Cent., Univ., Isfahan, Iran]

Analyses were carried out on 67 samples of milk from village producers (small-scale with 1-2 cows) and on 28 milk samples from commercial producers (large-scale with 100-300 cows) around Isfahan, Iran, during 1973 and 1974. 50-56.7% of the former and 0-10% of the latter samples were shown to be contaminated with aflatoxin M_1 and M_2. Identification of aflatoxin M_1 was by R_f, UV fluorescence and acetate derivative formation; M_2 was identified by R_f and UV fluorescence. Since nearly 85% of the Iranian population is rural and is dependent upon village milk, the results may identify a potentially hazardous public health problem. It is suggested that the difference in aflatoxin contamination of milk between large-scale and small-scale producers may be due to the methods used for storing and drying cow feed.
AS

116

[Thin-layer chromatographic detection of aflatoxin on silica gel prepared plates.] Zum dünnschichtchromatographischen Nachweis von Aflatoxin auf Kieselgel-Fertigplatten.
Thurm, V.
Nahrung 21 (3) 255-257 (1977) [7 ref. De, en, ru] [Hygiene-Inst. Wernigerode, German Democratic Republic]

A method is described for estimation of aflatoxins by TLC using prepared Kieselgel plates coated with starch on to Al foil (Silufol). Reagents used for separation and development were benzene:ethyl acetate:formic acid 5:4:1, followed by chloroform:methanol 97:3 and ethyl acetate:10% ammonia 1:1. Spots were examined by UV light at 380 nm. Clear separation of aflatoxins B1, G1, M1 and M2 was obtained with both standard solutions and extracts from contaminated milk and peanuts. Aflatoxin B1 was just detectable at 0.15 ng and distinctly at 0.3 ng, vs. 0.4 and 0.6 ng for conventional glass-coated plates; development time is also shorter with Silufol, which is recommended for routine food examinations. ELC

117

Aflatoxins in oilseeds - problems and solutions. [Conference proceedings]
Pons, W. A., Jr. **United States of America, American Oil Chemists' Society** (Chairman)
Journal of the American Oil Chemists' Society 54 (3) 216A-249A (1977) [En]

8 papers presented at the 67th Annual Spring Meeting of the American Oil Chemists' Society, held on April 21-24, 1976 at New Orleans, Louisiana are abstracted separately and will appear in the author index under **United States of America**, American Oil Chemists' Society [Aflatoxins Symposium]. VJG

118

[Determination of aflatoxins by high pressure liquid chromatography.] Beitrag zur Bestimmung von Aflatoxinen mittels Hochdruck-Flüssigkeitschromatographie.
Zimmerli, B.
Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 68 (1) 36-45 (1977) [20 ref. De, fr, en] [Eidgenössisches Gesundheitsamt, Bern, Switzerland]

The high pressure liquid chromatography (HPLC) separation of aflatoxins M_1, B_1, G_1, B_2 and G_2 on 2 columns (μ-Porasil and μ-Bondapak-C_{18}) is described. Using a UV-detector (wavelength 360 nm) the limits of detection are 1-5 ng, depending on the type of aflatoxin. With commercial fluorescence detectors, equipped with a silica gel-filled cell, detection limits of 0.05-0.2 ng are attainable. The described technique has been successfully applied to the detn. of aflatoxins in almonds and milk. SKK

119

[Detection and determination of aflatoxins in foods for infants.]
Lafont, P.
Annales d'Hygiene de Langue Francaise, Medecine et Nutrition **11** (1) 47-49 (1975) [13 ref. Fr] [INSERM, Unite de Recherche de Toxicologie Alimentaire, 44 Chemin de Ronde, 78110 Le Vesinet, BP 40, France]

Aflatoxins were determined by TLC in retail samples of various foods for infants. A table of results is given. The number of samples studied number of contaminated samples and mean and max. aflatoxin concn. found were, respectively: fruit-based meals 104, 3, 1.10 parts/billion (ppb) and 3 ppb; meat + vegetable meals 66, 4, 4.5 ppb and 8 ppb; carrots 26, 2, 7 ppb and 10 ppb; cereal products 48, 4, 2.4 ppb and 4.2 ppb; and dietetic confectionery 50, 20, 6.60 ppm and 13.5 ppm. No aflatoxins were detected in a total of 79 samples of fruit (peaches, apricots, pears, apples, quinces and plums). Only aflatoxin B_1 was detected in the products studied. AJDW

120

[Determination of aflatoxin.]
Anon.
Industrie Alimentari 16 (4) 85-86 (1977) [It]

A description is given of the Velasco Flourotoxin Meter, an instrument developed by Neotec Instruments Inc. (USA) for detn. of aflatoxins in a variety of products. The method involves a simple extraction stage with subsequent measurement of the fluorescence by colum chromatography. Details are given of the extraction stage, preparation of the columns (Fluorosil, alumina), absorption of the sample, and method of measurement. The method, adopted by the American Association of Official Analytic Chemists, is rapid, simple, requires little maintenance, has an accurary of 1 part/billion, and can detect aflatoxin in the 1-50 parts/billion range. HBr

121

Relationship of physical appearance of individual mold-damaged cottonseed to aflatoxin content. [Lecture]
Cucullu, A. F.; Lee, L. S.; Pons, W. A., Jr.
Journal of the American Oil Chemists' Society 54 (3) 235A-237A (1977) [9 ref. En] [S. Regional Res. Cent., USDA, PO Box 19687, New Orleans, Louisiana 70179, USA]

>700 individual aflatoxin-suspect cottonseeds were hand-selected from a heterogenous stockpile of ginned seed. The seeds were categorized on the basis of (i) bright greenish-yellow fluorescence, termed cateye, on the linther fibres under UV; (ii) partially bald seed with part of the linter fibres removed by ginning; (iii) a combination of cateye and balding; (iv) thin and discoloured lint; and (v) bluish, not cateye, fluorescence. Aflatoxin assays on each of the 771 selected seeds showed that 142 out of 771 (18%) were contaminated by aflatoxin (B_1 + B_2) in the range of 150 ppb-5.75 million ppb. Some 93% of the aflatoxin-contaminated seed was concentrated in categories (i), (ii) and (iii), with the highest concn. 61%, in category (ii). 8 seeds in these 3 categories contained > 1 million ppb of aflatoxins. The data suggest that removal of cateye and partially bald seed from contaminated lots of cottonseed should be more effective for controlling aflatoxin contamination in cottonseed than removal of cateye seed alone. [See FSTA (1977) 9 9C389.] AS

122

Separation of aflatoxin-contaminated cottonseed based on physical characteristics of seed cotton and ginned seed. [Lecture]
Lee, L. S.; Cucullu, A. F.; Pons, W. A., Jr.; Russell, T. E.
Journal of the American Oil Chemists' Society 54 (3) 238A-241A (1977) [11 ref. En] [S. Regional Res. Cent., USDA, PO Box 19687, New Orleans, Louisiana 70179, USA]

Samples of aflatoxin-contaminated stored ginned cottonseed and of freshly harvested seed cotton and companion ginned seed were examined under long wave UV and visible light to develop physical criteria for separating aflatoxin-contaminated seed from sound seed. Seed locks characterized by bright greenish-yellow, or cateye, fluorescence when viewed under long wave UV light were separated from samples of 12 var. of freshly harvested seed. As a result, 80-100% (mean 96%) of the aflatoxin contamination that was concentrated in 2-9% (mean 6%) of the seed wt. was effectively removed. The cateye fluorescence separation technique was slightly less effective for removing aflatoxins from companion freshly harvested, ginned samples, but most of the aflatoxins were concentrated in only 0.5-3% (mean 2%) of the seed wt. This approach was relatively ineffective for stored ginned seed, probably due to deterioration of the cateye fluorescence. [See FSTA (1977) 9 9C389.] AS

123

Solvent extraction of aflatoxins from contaminated agricultural products. [Lecture]
Rayner, E. T.; Koltun, S. P.; Dollear, F. G.
Journal of the American Oil Chemists' Society 54 (3) 242A-244A (1977) [18 ref. En] [S. Regional Res. Cent., USDA, PO Box 19687, New Orleans, Louisiana 70179, USA]

Solvent extraction of agricultural products has been suggested as an effective means of removing aflatoxins from mould-damaged commodities. The use of various polar solvents such as the azeotrope of acetone-hexane-water and of 2-prophanol-water, aqueous acetone, and aqueous ethanol has been reported in the literature. This paper examines the overall aspects of solvent extraction, in particular the use of the azeotrope of 2-propanol-water, to remove aflatoxins from prepress solvent extracted cottonseed meal. [See FSTA (1977) 9 9C389.] AS

124

[Mycotoxins and mycotoxicosis.] [Review]
Arda, M.
Veteriner Hekimler Dernegi Dergisi 45 (3) 5-18 (1975) [78 ref. Tr] [Vet. Fac., Univ., Ankara, Turkey]

This review deals with various aspects of mycotoxins and mycotoxicosis, including occurrence of aflatoxins in milk and cheese, their resistance to pasteurization temp. (72-77° C) and milk drying temp. (130° C), and the effects, diagnosis, prevention and treatment of aflatoxicosis in animals, etc. ADL

125

Processing edible peanut protein concentrates and isolates to inactivate aflatoxins. [Lecture]
Rhee, K. C.; Natarajan, K. R.; Cater, C. M.; Mattil, K. F.
Journal of the American Oil Chemists' Society 54 (3) 245A-249A (1977) [24 ref. En] [Food Protein Res. & Development Cent., Texas A&M Univ., College Station, Texas 77843, USA]

Experiments were conducted to study the efficacy of some oxidizing or other reactive chemicals for destruction of aflatoxins in conjuction with the aqueous extraction process for the production of peanut protein concentrates and/or isolates directly from contaminated raw peanuts. The chemicals tested included (i) acetone, (ii) isopropyl alcohol, (iii) methylamine, (iv) hydrogen peroxide, (v) benzoyl peroxide, (vi) ammonia gas, and (vii) sodium hypochlorite. Among these chemicals, (iv), (v) and (vii) showed very effective destruction of aflatoxins during the aqueous extraction process of infected peanuts. However, the use of (v) may pose some difficulties because it is not readily soluble in the aqueous suspensions. It was therefore concluded that aflatoxins can be effectively destroyed during the aqueous extraction process of infected peanuts. However, the use of (v) may pose some difficulties because it is not readily soluble in the aqueous suspensions. It was therefore concluded that aflatoxins can be effectively destroyed during the aqueous processing of peanuts by properly utilizing either (vii) or (iv) to produce either peanut protein concentrates or isolates. [See FSTA (1977) 9 9C389]. AS

126

[Fungal contamination of peanuts and peanut meals.]
Moreau, C.
Revue Francaise des Corps Gras 24 (1) 27-34 (1977) [46 ref. Fr, de, en, es] [Lab. de Biol. Vegetable et Microbiol., Fac. des Sci., Univ. de Bretagne Occidentale, 29283 Brest-Cedex, France]

Post-harvest mycological analysis of samples of peanuts showed that the surface of the pods was infected with a variety of soil-borne fungi, though only a few reached the kernels. The dominant species were Aspergillus flavus, A. niger and Lasiodiplodia theobromae. Contamination was affected by moisture, e.g. 12 000-20 000 organisms/g at 21% vs. 180/g at 16% kernel moisture. The degree of fungal contamination was not related to aflatoxin concn.; which was higher in the 16% than in the 21% moisture sample. Heat treatment of kernels in oil mills, and production of meals or pellets reduced the fungal population about 100-fold (e.g. to 220/g at the exit from the presses at 4.2% moisture), but it increased during storage (to 3400/g at 8.5%, 35 000 at 12% and 143 000/g at 18% moisture). Treating meals or pellets with NH_3 under pressure destroyed the aflatoxin and was fungistatic against a large spectrum of species including A. flavus (50% reduction by 15 min at a pressure of 2 bar, total elimination by 30 min at 3 bar). RM

127

Efficacy of electronic color sorting and hand picking to remove aflatoxin contaminated kernels from commercial lots of shelled peanuts.
Dickens, J. W.; Whitaker, T. B.
Peanut Science 2 (2) 45-50 (1975) [6 ref. En] [Dep. of Biol. & Agric. Eng., N. Carolina State Univ., PO Box 5906, Raleigh, N. Carolina 27607, USA]

Samples (200 lb) from 40 commercial lots of shelled peanuts which contained an average concn. of 48 parts/billion aflatoxin were sorted with an electronic colour sorter 3-5 times and then hand picked in an attempt to remove discoloured kernels which usually contain higher concn. of aflatoxin than other kernels. Prediction equations indicated that cumulative removal of 2, 4, 6, 8, and 10% of the kernels from each sample by electronic sorting would remove an average of 16, 28, 37, 45 and 51% of aflatoxin, respectively. Electronic sorting became less selective for aflatoxin-contaminated kernels during each additional sorting operation. Careful hand picking for discoloration was far more selective for aflatoxin-contaminated kernels than electronic colour sorting. An average 72% of the aflatoxin was in kernels that were removed by electronic sorting and subsequent hand picking. The efficacy of aflatoxin removal with electronic sorting was highly variable among lots. This variability indicates that each lot should be pretested to determine if aflatoxin can be effectively removed before the expense of electronic colour sorting is incurred. AS

128

Factors affecting Aspergillus flavus Lk. ex Fr. colonization of resistant and susceptible genotypes of Arachis hypogaea L.
Mixon, A. C.; Rogers, K. M.
Peanut Science **2** (1) 18-22 (1975) [17 ref. En] [Univ. of Georgia Coll. of Agric. Exp. Sta., Coastal Plain Sta., Tifton, Georgia 31794, USA]

2 genotypes (P. I. 337394F and P. I. 337409) resistant to seed colonization by aflatoxin-producing strains of A. flavus were used to study effects of initial adjusted seed moisture, incubation and storage time, seed maturity, harvest time and seed handling on seed colonization by the fungus. Under conditions highly favourable to the growth of the fungus, seed colonization (P. I. 337394F) was greater at 20% adjusted seed moisture than at 25%. Colonization was least at 15 and 30% adjusted moisture. A. flavus colonized 17% of cotyledons of P. I. 337409 genotype after 48 h of incubation, whereas 100% of cotyledons of P. I. 331326 (a susceptible genotype) were colonized. Colonization of P. I. 337394F seed with intact seed coats increased with increase in storage time from 0 to 6 and 12 wk, and with increase in temp. from 5 to 20 and 35° C. Immature and overmature seeds of both resistant genotypes with intact seed coats were more susceptible to colonization than sound-mature seed. However, seeds of the resistant genotypes were colonized at a low level, with no difference for seed harvested at 4 successive 2-wk intervals, whereas P. I. 331326 had greater colonization for each successive harvest date. Seed coat abrasion, soaking for 5 min in a H_2SO_4 solution, machine picking or machine-shelling increased colonization of seed over check treatments. AS

129

Survey of aflatoxins in California tree nuts. [Lecture]
Fuller, G.; Spooncer, W. W.; King, A. D., Jr.; Schade, J.; Mackey, B.
Journal of the American Oil Chemists' Society 54 (3) 231A-234A (1977) [14 ref. En] [W. Regional Res. Lab., USDA, Berkeley, California 94710, USA]

Surveys of the California walnut and almond crops to determine incidence of aflatoxins are reported. Average proportions of contaminated nuts from the field were one in 28 250 for walnuts and one in 26 500 for almonds. It was shown that there is a high correlation of contamination with damaged nuts which are removed by standard sorting procedures. Statistical treatment of data from the surveys indicates some of the problems in sampling tree nuts for analysis. [See FSTA (1977) 9 9C389]. AS

130

Aflatoxin control program for peanuts. [Lecture]
Dickens, J. W.
Journal of the American Oil Chemists' Society 54 (3) 225A-228A (1977) [15 ref. En] [USDA, N. Carolina State Univ., Raleigh, N. Carolina 27607, USA]

Under provisions of a USDA Marketing Agreement, an aflatoxin control programme for peanuts produced in the United States is administered by the Peanut Administrative Committee composed of peanut growers and shellers. Regulations of this committee contain provisions about the quality of peanuts acquired from farmers, storage of unshelled peanuts, aflatoxin testing, quality and disposition of processed lots, and indemnification of handlers for losses caused by lots which test over 25 ppb aflatoxin. Effects of the control programme on aflatoxin concn. in peanut products are discussed. [See FSTA (1977) 9 9C389]. AS

131

Aflatoxin in pecans: Problems and solutions. [Lecture]
Ayres, J. L.
Journal of the American Oil Chemists' Society 54 (3) 229A-230A (1977) [15 ref. En] [Gold Kist Res. Cent., 2230 Industrial Boulevard, Lithonia, Georgia 30058, USA]

The aflatoxin contamination potential in pecans has been clearly demonstrated in the literature. No definitive study has been published indicating the extent of aflatoxin contamination in pecans. Good manufacturing practices can be maintained in culture, drying, sizing, storing, and processing which should reduce the possibility of mould growth or aflatoxin production. Sampling of pecans for aflatoxin analysis would be costly due to the great number of pecan sizes and grades as well as to the high cost of pecans. Surveillance costs could be minimized by incorporating chopping with subsampling. [See FSTA (1977) 9 9C389]. AS

132

Aflatoxin in corn. [Lecture]
Shotwell, O. L.
Journal of the American Oil Chemists' Society 54 (3) 216A-224A (1977) [90 ref. En] [N. Regional Res. Cent., USDA, Peoria, Illinois 61604, USA]

Low incidence and levels of aflatoxin were identified in corn of all grades grown in the Midwest in 1964, 1965, and 1967. Later surveys indicate that corn grown in southern regions is subject to invasion by Aspergillus flavus and subsequent aflatoxin formation. This mycotoxin is formed either in the field or in storage. In the field, such factors as insect damage and weather conditions probably influence aflatoxin formation. In storage, temp. must be $>25°$ C and moisture levels $>16\%$ if toxin is to form. Aflatoxin formed in a hot spot in stored corn in the Midwest when temp. rose early in the summer and when the grain became wet because of leaks in the storage building. Analytical methods to detect and determine aflatoxin fall into 3 categories: presumptive tests indicating the presence of A. flavus and the possible occurrence of aflatoxin, rapid screening tests establishing the presence or absence of the toxin, and quantitative procedures determining toxin levels. Detoxification methods being studied include ammoniation and roasting. Ammoniated corn is being fed to domestic animals to determine whether it has adverse effects and whether toxic compounds are transmitted in animal tissues. [See FSTA (1977) 9 9C389.] AS

133

[Detection and quantitative determination of aflatoxins in foods.] [Review]
Egmond, H. P. van; Schuller, P. L.
Agricultura, Belgium 24 (3) 265-316 (1976) [35 ref. Nl] [Rijks Inst. voor de Volksgezondheid, Bilthoven, Netherlands]

This review includes an introductory section on the chemistry, toxicity and presence of aflatoxins in foods, and sections on sampling, isolation, detection, qualitative, quantitative and semi-quantitative detn. methods, and collaborative studies on aflatoxins. Established methods allow detn. of μg/kg amounts. RM

134

Effect of neutral fats and fatty acids on aflatoxin production.
Schultz, D. L.; Luedecke, L. O.
Journal of Food Protection 40 (5) 304-308 (1977) [24 ref. En] [Dep. of Food Sci. & Tech., Washington State Univ., Pullman, Washington 99163, USA]

The influence of neutral fats and fatty acids on aflatoxin production by Aspergillus flavus (AZCC 15546) was investigated using a chemically defined medium (glucose-salts-amino acids). The fat-fortified medium was inoculated with A. flavus spores and incubated at 28° C. Increasing concn. of tricaprylin (5-15%) repressed aflatoxin G_1 synthesis more than B_1 synthesis as compared to the control. Maximum concn. of G_1 and B_1 were attained within 3-6 days and then declined. Increasing amounts of tricaprylin had little influence on B_1 degradation following 3 days of incubation whereas G_1 degradation was pronounced after 3 days. Tristearin fortification of the medium produced results comparable to those obtained with tricaprylin. Within the 14-day incubation period, G_1 degradation rates exceeded those of B_1 in both the control and fortified samples. As compared to the control, both 15% linoleic acid and 15% stearic acid fortification of the medium repressed B_1 and G_1 synthesis; however, the difference became less pronounced with incubation time. The 15% stearic acid fortification facilitated greater B_1 yields than the 15% linoleic acid until the 9th day at which time B_1 accumulation in the linoleic acid fortification surpassed that of the stearic acid. The G_1 level in the 15% stearic acid-fortified medium attained 1300 μg within 3 days and declined to a trace at 14 days. Aflatoxin G_1 synthesis in the 15% linoleic acid-fortified medium was completely repressed throughout the entire incubation period. AS

135

Investigations of mycotoxins relative to coffee. (In '7th International Colloquium on the Chemistry of Coffee' [see FSTA (1977) 9 10H1670].) [Lecture]
Levi, C. P.; Trenk, H. L.; Yeransian, J. A.
pp. 287-294 (1976) [22 ref. En] [General Foods Corp., White Plains, New York, USA]

Analytical procedures for detection of aflatoxin B_1, ochratoxin A and sterigmatocystin in green coffee, investigation of their natural occurrence in samples of green coffee beans from various sources, and studies of experimental production of these toxins in the laboratory under controlled conditions using green coffee as substrate are described. AL

136

Gamma irradiation-recycling of Aspergillus flavus and its effect on radiation resistance and toxin production.
Faizur-Rahman, A. T. M.; Idziak, E. S.
Canadian Institute of Food Science and Technology Journal 10 (1) 5-8 (1977) [14 ref. En, fr] [Dep. of Microbiol., Macdonald Coll., McGill Univ., Quebec HOA 1CO, Canada]

The effect of γ-irradiation-growth recycling on radiation resistance and toxin production by Aspergillus flavus NRRL 2999 in various natural fruit and vegetable media was studied. Radiation cycling of spores of A. flavus 9 times at radiation doses equivalent to 0 ×, 1 ×, and 2 × D_{10} levels did not result in spore crops with increased radiation resistance. Also there was, in general, no increase in total toxin production, on the contrary, toxin production decreased in most instances. AS

137

Aflatoxin production on couscous.
Boutrif, E.; Morse, R. E.
Canadian Institute of Food Science and Technology Journal 9 (4) 186-188 (1976) [12 ref. En, fr] [Dep. of Food Sci., Cook Coll., State Univ., Rutgers, New Brunswick, New Jersey 08903, USA]

A study was made to determine whether couscous as prepared in N. Africa constitutes a potential source of aflatoxin intake. Couscous readily supports the production of B_1, B_2, G_1 and G_2 aflatoxins by Aspergillus parasiticus with optima at 28° C and 96% RH, conditions found in N. Africa during the rainy season in poorly prepared or stored couscous. No aflatoxin is produced below 11% moisture or 20° C. In deep beds of couscous, no aflatoxin is produced, though there may be profuse mycelial growth, perhaps due to decreased O_2 tension. AS

138

[Occurrence and content of aflatoxin M_1 in milk delivered to a dairy.] Vorkommen und Gehalt an Aflatoxin M_1 in Molkerei-Anlieferungsmilch.
Kiermeier, F.; Weiss, G.; Behringer, G.; Miller, M.; Ranfft, K.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 163 (3) 171-174 (1977) [12 ref. De, en] [Süddeutsche Versuchs- & Forschungsanstalt für Milchwirtschaft, Vöttinger Strasse 45, D-8050 Freising-Weihenstephan, Federal Republic of Germany]

79 (19%) of 419 samples of milk delivered to a dairy plant in March-April 1976 contained aflatoxin M_1 at levels ranging from 0.02 to 0.54 µg/l. (mean 0.12 µg/l.); no other aflatoxins were found. Aflatoxin B_1 was present in 45 (43%) of 105 feed samples from procedures of aflatoxin-containing milk; levels ranged from 7 to 300 µg/kg (mean 45.5 µg/kg). 47% of the feed samples formulated to DLG standard IV (15% groundnut meal) and 36% of those formulated to DLG standard III (8% groundnut meal) exceeded the tolerated max. level of 20 µg aflatoxin B_1/kg. A qualitative relationship was found between aflatoxin M_1 content of milk and aflatoxin B_1 content of feed. CDP

139

Incidence of aflatoxins in milk and milk products.
Paul, R.; Kalra, M. S.; Ajit Singh
Indian Journal of Dairy Science 29 (4) 318-321 (1976) [12 ref. En] [Dep. of Microbiol., Coll. of Basic. Sci. & Humanities, Punjab Agric. Univ., Ludhiana, India]

Incidence of aflatoxin M_1 in 21 individual cows' milk samples, 25 individual buffaloes' milk samples, 14 bulk milk samples from the University farm and 21 from the local market was respectively 14.3, 4.0, 7.1 and 0%. Highest aflatoxin M_1 concn. (13.3 µg/l.) occurred in a cows' milk sample. Aflatoxins B_1, B_2 and G_1 were not detected. Incidence of aflatoxins in 26 samples of cheese, 16 of dried' milk and 23 indigenous milk products (barfi, khoa, paneer) was respectively 23.1, 6.2 and 8.7%; aflatoxin B_1 was the main toxin, its concn. being 15 µg/kg in cheese. Aflatoxins B_2 and G_1 were detected in 3.8% of samples, but M_1 and G_2 were not detected. DMK

140

Incidence of mycotoxic molds in domestic and imported cured and smoked meats.
Bullerman, L. B.
Abstracts of the Annual Meeting of the American Society for Microbiology 77, 259 (1977) [En] [Univ. of Nebraska, Lincoln, Nebraska 68583, USA]

The mould flora of 86 samples of domestic and 85 samples of imported cured and smoked meats was studied. Each sample was analysed for: visible mould growth, isolation and classification of visible moulds, total viable mould plate counts, isolation and classification of representative moulds from plate counts, ability of mould isolates to produce known mycotoxins and development of visible mould growth during simulated storage of ½ of each sample. A total of 1038 was isolated from all sources, including 393 from domestic meats and 645 from imported meats. Of the total isolates, 68.1% were Penicillium, 2.4% Aspergillus, 4.9% Cladosporium, 5.8% Alternaria, 0.9% Fusarium and 17.9% various other genera. Potentially toxic spp. of moulds were found in the following amounts: P. cyclopium 8.5%, P. viridicatum 6.2%, A. flavus, 0.9% and A. glaucus 0.4%. Screening of mould isolates for mycotoxin production showed the presence of the following known mycotoxins in culture extracts: aflatoxins 0.5%, ochratoxin A 3.0%, patulin 1.5%, penicillic acid 1.8% and citrinin 0.1%. No other known mycotoxins were found in culture extracts. Of the sample halves stored at 5° C for 6 wk, mould growth developed in the following amounts: 20% none, 15% scant (2-3 colonies), 16% moderate (covering one side) and 40% extensive (covering more than one to all sides). All of the mould growth on the stored meat was of Penicillium spp. AS

141

A rapid method for detection of aflatoxins from xylitol.
Niskanen, A.; Lindroth, S.; Pensala, O.
European Journal of Applied Microbiology 2 (4) 307 (1976) [En] [Tech. Res. Cent., Finland Food Res. Lab., Biologinkuja 1, SF-02150 Espoo 15, Finland]

A sensitive method was developed for the detection of aflatoxins B_1, B_2, G_1 and G_2 in xylitol. Xylitol solutions were extracted with chloroform and dried over anhydrous Na_2SO_4. Dried extract was redissolved in benzene and spotted on activated TLC plates. Quantification of aflatoxins was performed either visually under UV light (365 nm) or flourodensitometrically. Results showed that recovery of aflatoxins B_1 and G_1 was on average 64.0 and 75.0%. The sensitivity of the method was about 1.0 µg/kg xylitol. CRI

142

On testing normality using several samples: an analysis of peanut aflatoxin data.
Quesenberry, C. P.; Whitaker, T. B.; Dickens, J. W.
Biometrics 32 (4) 753-759 (1976) [18 ref. En, fr] [Dep. of Statistics, N. Carolina State Univ., Raleigh, N. Carolina 27607, USA]

A sampling plan for peanuts must provide a high level of protection for the consumer and reasonable assurance to the processor that lots of good peanuts are not rejected by the testing programme. Samples consisting of replicate detn. in peanut subsamples were considered statistically. Results of statistical analysis indicated that the normal model fitted the data quite well and definitely better than the lognormal model. AL

143

Laser fluorimetry: subpicogram detection of aflatoxins using high-pressure liquid chromatography.
Diebold, G. J.; Zare, R. N.
Science, USA 196 (4297) 1439-1441 (1977) [20 ref. En] [Dep. of Chem., Columbia Univ., New York, New York 10027, USA]

The use of high-pressure liquid chromatographic separation in conjunction with laser-induced fluorescence detection permits the analysis of trace fluorescent species at new limits of sensitivity. This technique was applied to the carcinogens aflatoxins B_1, B_2, G_1 and G_2, which were linearly quantitated to 7.5×10^{-13} g. The procedure consists of forming more fluorescent aflatoxin derivatives, eluting the aflatoxins from a reverse-phase column, focusing the 325-nm output of a helium-cadmium ion laser into a suspended droplet of the eluent, and measuring the resulting fluorescence using phase-sensitive detection. [The limit of detection of aflatoxin B_1 in a corn sample with this method was approx. 2 parts/billion, but with better cleaning procedures this should be further reduced.] AS

144

[Moulds and mycotoxins: methods of identification, prevention and elimination.] [Conference proceedings]
Italy, Societa Italiano di Microbiologia Applicata (SIMA)
Industrie Alimentari 16 (6) 67-141 (1977) [many ref. It]

Papers read at a Symposium held in Milan on March 16, 1977 under the auspices of the Italian Society of Applied Microbiology and organized by Pool Bioanalysis Italiana are presented. They include: Detection techniques for moulds in foods: A review, by P. Camaschella (pp. 68-74, 66 ref.); Antimycotic treatment in some sections of the food industry, by G. Cirilli (pp. 74-76); Prevention of degradation of paints and varnishes used in the food industry, by A. Massara, C. Cantoni & M. A. Bianchi (pp. 77-82); Moulds and bakery products, by A. Alfieri (pp. 82-84); Prevention and elimination of fungal contamination in the bakery industry, by M. Campana (pp. 85-87); Moulds and foods of animal origin: A review, by C. Cantoni, S. D'Aubert & P. Cattaneo (pp. 90-97, 50 ref.); Prevention of mould formation on meat products, by P. C. Moerman (pp. 98-100, 18 ref.); Detection of mycotoxins in feeds and foods: A review, by N. Fiussello (pp. 100-103, 17 ref.); Isolation and identification of toxic fungal strains, by J. Ceruti Scurti (pp. 104-106, 15 ref.); [Continued in following abstr.] HBr

145

[Moulds and mycotoxins: methods of identification, prevention and elimination.] [Conference proceedings]
Italy, Societa Italiano di Microbiologia Applicata (SIMA
Industrie Alimentari 16 (6) 67-141 (1977) [many ref. It]

[Continued from preceding abstr.] Moulds and mycotoxins in Italian cheeses, by S. Carini & G. Cerutti (pp. 106-108, 3 ref.); Gezet, an antimycotic product for external treatment of cheese, by B. W. Jilly (pp. 109-111, 9 ref.); Antimycotic experiments in the Friuli cheese factory, by M. Costanzo (pp. 111-112); Mycotoxins in cheese, by J. J. Devoyod (pp. 112-114); Aflatoxins in oilseeds: Methods of identification and prevention, by R. Monacelli (pp. 114-116); Physico-chemical detn. of mycotoxins, particularly aflatoxins, by M. Jemmali (pp. 117-119); Analysis and detn. of mycotoxins in foods, by P. Lafont & J. Lafont (pp. 119-123, 36 ref.); Use of new degradable fungicides in the prevention and elimination of mould contamination, by R. R. Vidal y Plana, P. Senin, F. Makovec & C. Vidali (pp. 129-131, 3 ref.); Moulds and their metabolites in cereals for the brewing industry, by F. Collavo (pp. 132-134, 5 ref.); and Food mycotoxicosis, by C. Bessler, J. Amici & V. A. di Leo (pp. 135-141). HBr

146

Aflatoxins in Egyptian foodstuffs.
Girgis, A. N.; El-Sherif, S.; Rofael, N.; Neshcim, S.
Journal of the Association of Official Analytical Chemists 60 (3) 746-747 (1977) [4 ref. En] [Nat. Organization for Drug Control & Res., Cairo, Egypt]

6 samples each of wheat, corn, lentils, beans, fenugreek, peanuts and cottonseed cake from various areas of Egypt were analysed for aflatoxins both at the time of collection and after 12 months' storage. Aflatoxin was found at low levels (3-12 parts/billion total aflatoxins) in 14 of 42 samples, as follows: 1 sample each of corn, lentils and beans; 2 peanut samples; 3 fenugreek samples; and 6 cottonseed cake samples. None of the samples contained aflatoxins above 11.7 parts/billion. AS

147

Incidence of toxic and other mold species and genera in soybeans.
Mislivec, P. B.; Bruce, V. R.
Journal of Food Protection 40 (5) 309-312 (1977) [23 ref. En] [Div. of Microbiol., FDA, Washington, DC 20204, USA]

The mould flora of 385 unprocessed soybean samples was determined before and after surface disinfection of the beans with 5% NaOCl. Moulds were detected in 99.4% of the 19 250 non-disinfected soybeans examines and in 52.8% of the 19 250 surface-disinfected soybeans examined, indicating that contamination was primarily at the surface, although internal invasion also was substantial. The mould flora, both before and after surface disinfection, was dominated by spp. of the Aspergillus glaucus group, A. flavus, A. candidus, Penicillium cyclopium, plus spp. of Alternaria and Cladosporium. The toxicogenic spp. A. flavus, A. nidulans, A. ochaeceus, A. versicolor, Penicillium citrinum, P. cyclopium and P. viridicatum were encountered regularly in non-surface-disinfected soybeans. Except for A. flavus and P. cyclopium, the occurrence of toxicogenic spp. in surface-disinfected soybeans was sporadic. The toxicogenic spp. A. melleus, P. expansum and P. urticae were encountered occasionally, but only in non-surface-disinfected soybeans. P. chrysogenum, the penicillin-producing organism, was encountered regularly in non-surface-disinfected soybeans, but less frequently in disinfected soybeans. AS

148

Aflatoxin in Tunisian Aleppo pine nuts.
Boutrif, E.; Jemmali, M.; Pohland, A. E.; Campbell, A. D.
Journal of the Association of Official Analytical Chemists 60 (3) 747-748 (1977) [4 ref. En]
[Inst. Nat. de Nutr. & de Tech. Alimentaire, Tunis, Tunisia]

26 of 50 Aleppo pine nut samples collected throughout Tunisia showed relatively high levels of contamination by aflatoxin. Some samples contained as much as 2000 parts/billion aflatoxin B_1, and very few contained < 100 parts/billion. Total aflatoxins as high as 7550 parts/billion were found. A traditional pudding, widely consumed in Tunisia, which was prepared from contaminated nuts still contained > 80% of the aflatoxin originally present in the nuts. AS

149

Note on a two-dimensional TLC procedure for determining aflatoxins in corn. [Lecture]
Alexander, R. J.; Baur, M. C.
Cereal Chemistry 54 (3) 690-704 (1977) [2 ref. En] [Krause Milling Co., Milwaukee, Wisconsin 53201, USA]

A procedure is described for the extraction and detn. of aflatoxins from samples of mouldy corn - these samples possess substances which interfere with a screening test for aflatoxins [see FSTA (1974) 6 12M166f]. The basis of the method is 2-dimensional TLC; the first dimension in 12:88 (v/v) acetone/chloroform and the second dimension in 95% denatured ethyl alcohol. The dried plates are examined under UV light, and the intensity of aflatoxin spots compared with spots from standard aflatoxin solutions. The method was applied to spiked corn samples, and gave an accuracy of about ± 20%. A mouldy corn sample was analysed by 3 investigators; the lowest and highest estimates were 84 and 109% of the average (350 parts/billion aflatoxin B_1). DIH

150

Aflatoxin occurrence in 1973 corn at harvest. III. Aflatoxin distribution in contaminated, insect-damaged corn.
Shotwell, O. L.; Goulden, M. L.; Lillehoj, E. B.; Kwolek, W. F.; Hesseltine, C. W.
Cereal Chemistry 54 (3) 620-626 (1977) [21 ref. En] [N. Regional Res. Cent., USDA, Peoria, Illinois 61604, USA]

The distribution of aflatoxin was studied in samples of insect-damaged, aflatoxin-contaminated corn freshly harvested in 1973 in northeastern South Carolina, USA. Corn in samples from 6 lots was separated into fractions based on the bright greenish-yellow fluorescence (associated with aflatoxin) and rice weevil and other damage. Fractions containing outwardly sound kernels from the 6 samples had 67-87% of the total wt. 4 had no detectable aflatoxin; 2 had 9 and 13% of the total aflatoxin B_1 in their respective total samples. Kernels and pieces with obvious fluorescence and fluorescence under the seed coat represented only 0.1-0.4% of the total wt. of each of the 6 samples, but comprised 35-90% of the B_1. At least 75% of the fluorescing kernels and pieces had obvious insect damage. In the 5 samples containing 24-47 parts/billion aflatoxin B_1, fractions with insect damage without BGY fluorescence and broken corn-foreign material accounted for 2-8% of the wt. and 61-91% of the toxin. Fractions from these samples without insect damage made up 92-98% of the wt. and 9-39% of the B_1. The sample with 209 parts/billion aflatoxin B_1 had the following distribution of wt. and B_1: fractions without visible insect damage - 72% wt., 16% B_1: and fractions with insect damage - 28% wt., 84% B_1. A few highly contaminated kernels accounted for appreciable amounts or most of the aflatoxin in the lots of corn studied. [See FSTA (1977) 9 2M165 for part II.]
AS

151

[Isolation and purification of aflatoxins produced by Aspergillus flavus on wheat and rice.]
Lempka, A.; Wojciechowska, M.; Ludwiczak, M.
Zeszyty Naukowe Akademia Ekonomiczna w Poznaniu Seria I, Prace z Zakresu Towaroznawstwa i Chemii No. 58, 33-36 (1974) [13 ref. Pl] [Akad. Ekonomiczna, Poznan, Poland]

Rice and wheat were used for cultivation of A. flavus strain TI WSEp (aflatoxin synthesizing). After 7 days, the aflatoxins were extracted by chloroform, and precipitated from the conc. chloroform extract by n-hexane. The dried precipitate, after repeated dissolution in chloroform, was transferred to a column with Al_2O_3. The aflatoxins were eluted with benzene and chloroform mixtures in ratios of 5:1, 1:1, 1:2, 1:3 and 1:4. 300-ml fractions were analysed by TLC using glass plates with 0.5 mm silica gel and a mixture of chloroform-acetone (85:15). Fractions obtained in this way and containing aflatoxins B_1 and G_1 are recommended for use as controls for detn. of aflatoxins in foods by means of TLC.
STI

152

Aflatoxin and zearalenone occurrence in dry-milled corn products.
Stoloff, L.; Dalrymple, B.
Journal of the Association of Official Analytical Chemists 60 (3) 579-582 (1977) [15 ref. En]

[Div. of Chem. & Physics, FDA, Washington, DC 20204, USA]

82 corn dry-milling establishemnts in 20 States in the USA were surveyed concerning control practices for preventing the use of corn contaminated with aflatoxin or zearalenone. Prime products and by-products from each establishment were analysed for these mycotoxins to determine whether a correlation exists between control practices and product contamination. No zearalenone was detected in any product; there was little awareness of the potential for contamination with this mycotoxin. No correlation was found between control practices and aflatoxin contamination encountered, but there was a positive correlation between aflatoxin contamination and the geographical source of the corn. Reported experimental findings [see FSTA (1975) 7 8M959] in regard to the distribution of aflatoxin between prime product and by-product were generally corroborated. AS

153

Factors affecting aflatoxin contamination of cottonseed. I. Contamination of cottonseed with Aspergillus flavus at harvest and during storage.
Hamsa, T. A. P.; Ayres, J. C.
Journal of the American Oil Chemists' Society **54** (6) 219-224 (1977) [27 ref. En] [Dep. of Food Sci., Univ. of Georgia, Athens, Georgia 30602, USA]

154

Acute aflatoxicosis in lactating dairy cows. [Lecture]
Mertens, D. R.; Wyatt, R. D.
Journal of Dairy Science 60 (suppl. 1) 153-154 (1977) [En] [Univ. of Georgia, Athens, Georgia 30601, USA]

Administration of 50 or 150 mg aflatoxin by bolus, using gelatin capsules, to Holstein-Friesian cows for 5 consecutive days depressed milk production ($P < 0.01$) and increased milk fat % ($P < 0.01$). [See FSTA (1977) 9 11P1719.] DMK

155

A comparison of two methods for the analysis of aflatoxin M_1 in milk. [Lecture]
Bodine, A. B.; Davis, R. W.; Janzen, J. J.; Crawford, F. M.
Journal of Dairy Science 60 (suppl. 1) 153 (1977) [En] [Clemson Univ., Clemson, S. Carolina, USA]

The methods of (i) Pons et al. [FSTA (1974) 6 4P449] and (ii) Tuinstra & Bronsgeest [FSTA (1976) 8 1P159] were compared. Various concn. of aflatoxin M_1 in milk were obtained by feeding a cow 1.25 mg aflatoxin B_1/day in the concentrate for 7 days, and by adding known amounts of aflatoxin M_1 to milk. Each method consistently yielded recovery rates >87%, and there was no significant difference between means or variance of either method. (ii) was less time–consuming than (i) and had a lower threshold sensitivity of 0.005 µg/kg. [See FSTA (1977) 9 11P1719.] DMK

156

[Heat stability of aflatoxin M_1.] Hitzestabilität von Aflatoxin M_1.
Polzhofer, K.-P.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 164 (2) 80-81 (1977) [8 ref. De, en] [Unilever Forschungsgesellschaft mbH, Behringstrasse 154, D-2000 Hamburg, Federal Republic of Germany]

0.01 ppm aflatoxin M_1 was added to Emmental cheese, which was then processed by melting for 3-30 min at 90° C. On average, 91.2% of the aflatoxin was recovered in the processed cheese, ranging from 78% after 18 min melting to 113% after 15 min melting. ADL

157

[Distribution of aflatoxin M_1 in whey and curd during cheese manufacture.] Zur Verteilung von Aflatoxin M_1 auf Molke und Bruch bei der Käseherstellung.
Kiermeier, F.; Buchner, M.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 164 (2) 82-86 (1977) [22 ref. De, en] [Tech. Univ. München, Vöttinger Strasse 45, D-8050 Freising, Weihenstephan, Federal Republic of Germany]

In model experiments with a whey/curd wt. ratio of 80:20, the proportions of aflatoxin M_1 recovered in whey (41.4-47.4%) relative to those recovered in curd (48.0-54.1%) did not change significantly when the amount of rennet was increased from 1 to 8 mg/100 ml milk, with a constant renneting temp. of 35° C. When the renneting temp. was increased in the range 28-35° C, however, the proportion of aflatoxin recovered in curd decreased by about 12% while the proportion in whey remained unchanged. When the renneting temp. was raised to 50° C, the amount of aflatoxin in curd diminished by about 35%. Use of citric acid or lactic acid to precipitate casein resulted in approx. the same aflatoxin distribution between curd and whey as after use of rennet. Use of starter cultures gave a similar result. The aflatoxin content of the curd was reduced by about 7% when the curd was washed with 40 ml water, and by 22% when it was washed with 21 times its vol. of water (i.e. 50% of the vol. of the cheese milk). ADL

158

[Behaviour of aflatoxin M_1 during ripening and storage of cheese.] Verhalten von Aflatoxin M_1 während der Reifung und Lagerung von Käse.
Kiermeier, F.; Buchner, M.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 164 (2) 87-91 (1977) [29 ref. De, en] [Tech. Univ. München, Vöttinger Strasse 45, D-8050 Freising, Weihenstephan, Federal Republic of Germany]

3 cows were given aflatoxin B_1 in concentrates on 6 consecutive days. Their milk, which contained 2.5-2.6 μg aflatoxin M_1/l., was then used to make Camembert, Tilsit and fresh cheese, which was found to contain 8.2, 9.3 and 8.3 μg aflatoxin M_1/kg respectively. Of the aflatoxin M_1 in the milk, 57.2, 47.5 and 59.4% were recovered in the respective cheeses and 41.7, 46.2 and 38.5% in the whey. Heat treatment of fresh cheese for 5 min at 80° C did not reduce its aflatoxin M_1 content. During the first 2 wk of storage the aflatoxin M_1 content of cheese DM increased by 22.6% in Tilsit, 23.5% in non-heat-treated fresh cheese, 28.2% in heat-treated fresh cheese, 45.2% in the rind of Camembert, and 54.2% in the interior of Camembert. The Camembert mould did not appear to destroy any of the aflatoxin. In 3-month-old Tilsit stored unpackaged, the aflatoxin M_1 content was $<$21% higher in the rind than in the interior, but only because moisture losses at the surface of the cheese were about 20% higher. The aflatoxin M_1 content (in DM) of whey from Tilsit and fresh cheese manufacture changed little during freeze-drying or during subsequent storage for 40 days. ADL

159

[Model experiments on aflatoxin formation in processed cheese.] Modellversuche zur Aflatoxinbildung in Schmelzkäse.
Polzhofer, K.-P.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 164 (2) 94-95 (1977) [11 ref. De, en] [Unilever Forschungsgesellschaft mbH, Behringstrasse 154, D-2000 Hamburg 50, Federal Republic of Germany]

Processed cheese was inoculated with Aspergillus flavus. After 16 days incubation at 25° C and about 90% RH the cheese contained 35 ppm aflatoxin B_1, 66 ppm aflatoxin G_1, 8.6 ppm aflatoxin B_2, 5.3 ppm aflatoxin G_2 and 2.1 ppm aflatoxin M_1. After 7 days incubation, processed cheese made with about 3% emulsifying salt (the normal concn.) contained 0.24 ppm aflatoxin B_1 and 0.445 ppm aflatoxin G_1, but cheese made with 15% emulsifying salt contained only 0-0065 ppm aflatoxin B_1 and 0-0036 ppm aflatoxin G_1, and cheese made with 6% NaCl contained only 0-0086 ppm aflatoxin B_1 and 0-012 ppm aflatoxin G_1. ADL

160

A clean-up procedure for HPLC analysis of aflatoxins in agricultural commodities.
Lansden, J. A.
Journal of Agricultural and Food Chemistry 25 (4) 969-971 (1977) [7 ref. En] [Nat. Peanut Res. Lab., USDA, Dawson, Georgia 31742, USA]

A minicolumn method was modified as a simple, efficient clean-up procedure for use with high-pressure liquid chromatography for detn. of aflatoxins in peanuts, rice and corn. The procedure, which utilizes a heavy metal salt precipitation combined with a short alumina filtration under vacuum, can be easily adapted to various sample sizes and provides adequate clean-up for use with both micro-particulate and pellicular solid support columns. AS

161

High-pressure liquid chromatographic method for detection and resolution of rubratoxin, aflatoxin, and other mycotoxins.
Engstrom, G. W.; Richard, J. L.; Cysewski, S. J.
Journal of Agricultural and Food Chemistry 25 (4) 833-836 (1977) [42 ref. En] [Nat. Anim. Disease Cent., Vet. Res. Service, USDA, Ames, Iowa 50010, USA]

A high-pressure liquid chromatography system (HPLC) was developed to resolve a mixture of 7 mycotoxins (aflatoxin B_1, aflatoxin G_1, ochratoxin A, zearalenone, rubratoxin B, patulin and penicillic acid). This HPLC system includes a new UV detector, a reverse phase μ Bondapak/C_{18} column and a solvent system of acetonitrile/water/glacial acetic acid (55:45:2 or 45:55:2, v/v/v). Detection limits were as low as 5 ng rubratoxin B, 1 ng zearalenone, 0.04 ng ochratoxin A (254 nm), and 1 ng aflatoxin B_1 or G_1 (365 nm). This system also resolved trichothecin from the other 6 mycotoxins in the absence of ochratoxin A, roseotoxin B from the other 6 mycotoxins in the absence of rubratoxin B, and sterigmatocystin from the other 6 mycotoxins in the absence of zearalenone. AS

162

[Harmful chemicals in foods.]
Lempka, A.
Zeszyty Naukowe Akademia Ekonomiczna w Poznaniu Seria I, Prace z Zakresu Towaroznawstwa i Chemii No. 58, 17-22 (1974) [Pl] [Akad. Ekonomiczna, Poznan, Poland]

A general discussion is given of the major sources of harmful chemicals (soil, water, atmosphere); the major inorganic harmful chemicals (heavy metals, S-containing compounds); the major natural harmful substances (mycotoxins); and the major synthesized harmful compounds (pesticides, detergents). STI

163

Sensitive silica gel-packed flowcell for fluorometric detection of aflatoxins by high pressure liquid chromatography.
Panalaks, T.; Scott, P. M.
Journal of the Association of Official Analytical Chemists 60 (3) 583-589 (1977) [10 ref. En] [Health and Welfare Canada, Food Res. Lab., Health Protection Branch, Ottawa, Ontario K1A OL2, Canada]

Aflatoxins B_1, B_2, G_1 and G_2 were quantitatively detected by high pressure liquid chromatography on a 5 μm particle size Lichrosorb column, using a Lichrosorb-packed flowcell in the fluorometric detector. The relationship between peak height and the amount injected was linear only up to about 2 ng but showed a linear log-log relationship. Methods for constructing and packing the flowcell are given. A guard column and venting valve were used to minimize deterioration of the analytical column and the adsorbent-packed flowcell. The method was applied to a peanut butter extract, although with the cleanup procedure used, the life expectancy of the flowcell is limited. AS

164

[Contamination of foods with mycotoxin-producing fungi.] [Review]
Ichinoe, M.; Kurata, H.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] 17 (5) 337-344 (1976) [55 ref. Ja] [Nat. Inst. Hygienic Sci., Kamiyoga, l-chome, Setagaya-ku, Tokyo, Japan]

Recent work on mycotoxins and mycotoxin-producing fungi is reviewed with respect to contamination of domestic (Japanese) and imported foods. The potential production of aflatoxin, sterigmatocystin, ochratoxin, penicillic acid and patulin was investigated for various fungi. TM

165

Aflatoxins.
Anon.
Food Processing 37 (12) 64-65 (1976) [En]

The problems of aflatoxin contamination of foods, particularly nuts and corn, is discussed, with reference to the FDA regulations concerning aflatoxins in nuts, and testing procedures. JRR

166

Occurrence and distribution of mycotoxic flora in some Nigerian foods.
Adekunle, A. A.; Ayeni, O.
Egyptian Journal of Microbiology 9 (1/2) 85-95 (1974 publ. 1976) [12 ref. En, ar] [Dep. of Biochem., Univ. of Ibadan, Ibadan, Nigeria]

The fungal contamination of 15 Nigerian foods, purchased from 4 district markets, was examined. The most frequently occurring genera were Cladosporium (29.4% of total), Aspergillus (23.2%), Penicillium (18.8%) amd Fusarium (16.7%). The sp. distribution of flora are tabulated, as are the % flora distribution for each food type and the % occurrence of fungal spp. in each food type. The most heavily contaminated foods were maize, groundnut, gari and millet, but other foods were only marginally less contaminated. DIH

167

Proceedings of the Thirtieth Annual Corn and Sorghum Research Conference, held in Chicago, Illinois, December 9-11, 1975. [Conference proceedings]
United States of America, American Seed Trade Association, Corn & Sorghum Division
x + 320pp. (1975) [many ref. En] 1030 15th Street N. W., Suite 964, Washington, DC 20005, USA Price $5.00

The report of the conference (Publication No. 30 of the American Seed Trade Association) includes the following papers: Protein quality improvement in maize, by M. S. Zuber (pp. 166-184, 7 ref.); Aflatoxin problems in corn and possible solutions, by E. B. Lillehoj & M. S. Zuber (pp. 230-250, 67 ref.); and Breeding corn for increased oil content, by S. A. Watson & J. E. Freeman (pp. 251-275, 46 ref.). AL

168

State of aflatoxin in groundnut oil.
Basappa, S. C.; Sreenivasa Murthy, V.
Journal of Food Science and Technology, India 14 (2) 57-60 (1977) [5 ref. En] [Cent. Food Tech. Res. Inst., Mysore, India]

Commercial groundnut oil was subjected to centrifugal force ranging from 10 000 to 218 000 g to isolate the aflatoxin. The suspended materials in the oil, which contained about 60-65% of the aflatoxin, were sedimented at 40 000 g. Filtration with membrane filter, sintered glass and filter paper could separate 30-50% of the toxin in the oil. Use of activated Fullers' earth as an adsorbent at 2% level and centrifugation at 10 000 g sedimented nearly 92.5% of the aflatoxin, thereby indicating its suitability for commercial application. CFTRI

169

Studies on aflatoxin content of groundnut oil in Andhra Pradesh with reference to climatic conditions and seasonal variations.
Giridhar, N.; Krishnamurthy, G. V.
Journal of Food Science and Technology, India 14 (2) 84-85 (1977) [8 ref. En] [CFTRI Exp. Sta., Hyderabad-500 018, India]

A survey was conducted in Andhra Pradesh (India) to find out the extent of aflatoxin contamination in commercial groundnut oil. Samples were collected from 3 climatic regions of the state and from the crops grown in 2 seasons. Of the 1209 oil samples analysed, 44.2% contained toxin, and of these 25.7% contained > 100 parts/billion toxin. Oil extracted from the kharif (rainy) season crop contained higher toxin concn. compared to rabi (winter) season; the dry area crop contained lower concn. of toxin. CFTRI

170

[Mycotoxins in dairy products.] [Review]
Moreau, C.
Lait 56 (555/556) 286-303 (1976) [80 ref. Fr, en] [Lab. de Biol. Vegetale et de Microbiol., CNRS, Univ. de Bretagne Occidentale, 29279 Brest Cedex, France]

This review considers the transfer of aflatoxins from fodder into milk, and the formation of mycotoxins in dairy products (such as dried milk, cheese and butter) due to fungal contamination. MEG

171

[Influence of raw milk processing on the aflatoxin M_1 content of milk products.] Einfluss der molkereitechnischen Behandlung der Rohmilch auf den Aflatoxin-M_1-Gehalt der daraus hergestellten Produkte.
Kiermeier, F.; Mashaley, R.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 164 (3) 183-187 (1977) [32 ref. De, en] [Lehrstuhl für Milchwirtschaft, Tech. Univ. München, D-8050 Freising-Weihenstephan, Federal Republic of Germany]

In view of contradictory results in the literature, the influence of raw milk processing on aflatoxin content was tested under conditions as close as possible to practical conditions. It was found that aflatoxin M_1 content decreased by 11-25% (from 0.17 µg/100 ml) during 1-3 days at +5° C, irrespective of whether the milk was pasteurized milk, UHT milk, naturally contaminated raw milk, or raw milk contaminated artificially with a standard solution. Although the decrease was thought to be due to air oxidation, this was not conclusively confirmed by experiments with N_2 and O_2. At -18° C aflatoxin M_1 content fell by about 30% within 7 days in artificially contaminated milk, but the decrease was much less in naturally contaminated milk and in freeze-dried samples. Contradictions in reported results are thought to be partly due to the type of contamination (artificial vs. natural). Reductions due to heat treatment ranged from 12% (naturally contaminated milk heated for 40 s at 75° C) to 40.5% (artificially contaminated milk heated for 30 min at 74° C). In buttermaking experiments, most of the aflatoxin in the original whole milk went into the buttermilk and only 18-28% into the butter; the ratio of aflatoxin to SNF content was fairly constant in all products. ADL

COPYRIGHT REGULATIONS

Form of Declaration and Undertaking

To the Editor, International Food Information Service, Shinfield,
Reading RG2 9AT, Berkshire, England.

1. I...

of..

Hereby request you to make and supply to me a

Photocopy of the article covered by

Journal name..

Volume .... Part .... Pages .... Year ....

which I require for the purposes of research or private study.

2. I have not previously been supplied with a copy of the said article/part of the said work by any librarian.

3. I undertake that if a copy is supplied to me in compliance with the request made above, I will not use it except for the purposes of research or private study.

Signature .... Date ....

(Note: This must be the personal signature of the person making the request. A stamped or typewritten signature or the signature of an agent is NOT sufficient.)

4. Send this form and remittance (10p per page) to the above address. (Minimum charge £1)

(Note: Additional forms are available on request)

FOOD ANNOTATED BIBLIOGRAPHIES (FABs).

FAB		Vol. 1 - 7 incl. Price	Vol. 8 1976 Price	Vol. 9 1977 updated monthly Price
1	Application of Reverse Osmosis to Food Processing	☐ £8.00	☐ £3.00	☐ £6.00
2	New Sources of Food Protein	☐ £15.00	☐ £6.00	☐ £13.00
3	Natural and Synthetic Sweeteners	☐ £9.00	☐ £3.00	☐ £7.00
4	Techniques for Analysis of Flavour Volatiles	☐ £13.00	☐ £3.00	☐ £8.00
5	Microwaves in Food Processing	☐ £8.00	☐ £3.00	☐ £6.00
6	Texture Analysis of Foods	☐ £18.00	☐ £4.00	☐ £9.00
7	Synthetic Dairy Products	☐ £8.00	☐ £3.00	☐ £6.00
8	Acidulants in Foods	☐ £11.00	☐ £3.00	☐ £6.00
9	Agglomeration of Powders	☐ £8.00	☐ £3.00	☐ £6.00
10	Aseptic Packaging	☐ £8.00	☐ £3.00	☐ £7.00
11	EEC Regulations	☐ £8.00	☐ £3.00	☐ £6.00
12	Toxicology of Food Additives	☐ £8.00	☐ £3.00	☐ £7.00
13	Deep Fat Frying	☐ £11.00	☐ £3.00	☐ £8.00
14	Viscosity of Foods	☐ £11.00	☐ £3.00	☐ £7.00
15	Taste Panels in Food Science	☐ £8.00	☐ £3.00	☐ £8.00
16	Taints in Foods	☐ £8.00	☐ £3.00	☐ £7.00
17	Microbial Toxins in Foods	☐ £8.00	☐ £3.00	☐ £8.00
18	Smoked Food Products	☐ £9.00	☐ £3.00	☐ £6.00
19	Disposal of Waste Food Products	☐ £12.00	☐ £5.00	☐ £9.00
20	Use of Glucose in Food Products	☐ £8.00	☐ £3.00	☐ £6.00
21	Emulsifiers in Foods	☐ £9.00	☐ £3.00	☐ £7.00
22	Stabilizers in Foods	☐ £9.00	☐ £3.00	☐ £7.00
23	Staling and Antistaling Additives	☐ £8.00	☐ £3.00	☐ £6.00
24	Catering Industry	☐ £8.00	☐ £3.00	☐ £6.00
25	Antioxidants	☐ £9.00	☐ £3.00	☐ £7.00
26	Nitrosamines	☐ £8.00	☐ £3.00	☐ £6.00
27	Content and Analysis of Mercury in Foods	☐ £6.00	☐ £3.00	☐ £7.00
28	Content and Analysis of Lead in Foods	☐ £7.00	☐ £3.00	☐ £6.00
29	Heatable Packs	☐ £6.00	☐ £3.00	☐ £6.00
30	Sulphur Dioxide in Food Products	☐ £8.00	☐ £3.00	☐ £6.00
31	Lactic Acid Bacteria in Beverages and Food	☐ £11.00	☐ £3.00	☐ £8.00
32	Colorants	☐ £9.00	☐ £3.00	☐ £6.00
33	Browning of Foods	☐ £8.00	☐ £3.00	☐ £6.00
34	Aflatoxins	☐ £7.00	☐ £3.00	☐ £7.00
35	Antibiotic Properties and Residues in Food excluding Nisin	☐ £8.00	☐ £3.00	☐ £6.00
36	Nisin	☐ £6.00	☐ £3.00	☐ £6.00
37	Cadmium in Foods	☐ £6.00	☐ £3.00	☐ £6.00
38	Coffee	☐ £10.00	☐ £3.00	☐ £7.00
39	Sorbic Acid	☐ £7.00	☐ £3.00	☐ £6.00
40	Arsenic in Foods	☐ £6.00	☐ £3.00	☐ £6.00
41	Ascorbic Acid	☐ £5.00	☐ £3.00	☐ £8.00
42	Thickeners and Gelling Agents	☐ £4.00	☐ £3.00	☐ £6.00
43	Pseudomonadaceae and Food Processing	☐ £5.00	☐ £3.00	☐ £6.00
44	Spores in Food	☐ £3.00	☐ £3.00	☐ £7.00
45	Breadmaking	☐ £9.00	☐ £3.00	☐ £6.00
46	Bread Properties	☐ £8.00	☐ £3.00	☐ £6.00
47	Food Science and Technology Books	☐ £11.00	☐ £6.00	☐ £12.00
48	Nitrates and Nitrites in Meat Products	☐ *£4.00	☐ £3.00	☐ £7.00
49	Eggs & Poultry Meat	☐ *£8.00	☐ £6.00	☐ £10.00
50	Mycotoxins in Foods (Excluding Aflatoxins & Microbial Toxins)	☐ £4.00	☐ £3.00	☐ £6.00
51	Meat Canning	☐ *£4.00	☐ £3.00	☐ £7.00

Prices include postage by surface mail. For airmail rates, please apply to the address below. * Vol. 6 - 7 only available

To order, or obtain further information, mark the item required, add your name and address and send cash, cheque or postal order to:–

International Food Information Service (IFIS)
Lane End House,
Shinfield, Reading, RG2 9BB,
England.

NAME ....

ADDRESS ....

INTERNATIONAL FOOD INFORMATION SERVICE

ifis

FAB 34

AFLATOXINS

SELECTED FROM VOLUME 10
FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

under the direction of

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks; Gesellschaft fur Information und Dokumentation, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen.

INTRODUCTION

Food Annotated Bibliographies (FABs) are collections of abstracts on specific topics in food science and technology. The topics are chosen by the staff of the International Food Information Service as being of particular interest or importance. The topics normally interest individual workers, who may not require the full information provided in Food Science and Technology Abstracts, from which the abstracts for FABs are taken. The size and the cost of the FABs are controlled as much as possible with the interests of individual workers in mind.

Titles of the FABs now available are given on the back cover of this booklet. New titles are being added at the rate of about 10 per year. For up-to-date lists of FABs or suggestions for new topics please write to the address given overleaf. New subjects are searched for at least the five most recent volumes of Food Science and Technology Abstracts. Thereafter each FAB is updated monthly. Copies of each months abstracts on any topic may be obtained as indicated on the back cover of this publication. At the end of each volume of up-dating, the abstracts are merged and made available as a separate supplement to the original FAB.

Some of the larger FABs have been divided into sections to facilitate use. Abstracts are not printed in more than one section. The larger FABs also have subject indexes provided.

Copies of all original articles referred to in the abstracts may be bought (or occasionally borrowed) from the International Food Information Service. A form for ordering these is provided at the end of this FAB.

Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journ patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularl needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

ASSISTANT EDITOR

1

Reduction of aflatoxin B_1 with zinc borohydride: an efficient preparation of aflatoxicol.
Hsia, M.-T. S.; Chu, F. S.
Experientia 33 (9) 1132-1133 (1977) [11 ref. En] [Food Res. Inst., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

A simple and mild reduction of aflatoxin B_1, involving treatment of aflatoxin B_1 with ethereal zinc borohydride to give 57-65% yield of diastereometric aflatoxicols, is described. AS

2

[Mycotoxin detection. I. Routine aflatoxin detection.] 1. Mitteilung zum Mykotoxinnachweis - der routinemässige Aflatoxinnachweis.
Kneist, S.; Koch, H. A.
Zeitschrift für die Gesamte Hygiene und ihre Grenzgebiete 23 (6) 417-419 (1977) [8 ref. De, en, ru] [Mykologische Abteilung, Hautklinik der Med. Akad., Erfurt, German Democratic Republic]

Required characteristics of analytical techniques for routine testing for aflatoxins are discussed. It is suggested that TLC is of value only as a screening method, as errors may result from interference by substances giving an aflatoxin-like response. Errors can be eliminated by subsequent spectrophotometric analysis; instruments recommended include the Zeiss Spekol and Specord UV VIS spectrophotometers (respective detection limits 0.01-1.0 μg and 1-18 μg aflatoxin B_1/ml in chloroform). IN

3

Preparation and characterization of aflatoxin B_1-1-(O-carboxymethyl) oxime.
Chu, F. S.; Hsia, M.-T. S.; Sun, P. S.
Journal of the Association of Official Analytical Chemists 60 (4) 791-794 (1977) [13 ref. En] [Food Res. Inst., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

4

Reverse phase analytical and preparative high pressure liquid chromatography of aflatoxins.
Stubblefield, R. D.; Shotwell, O. L.
Journal of the Association of Official Analytical Chemists 60 (4) 784-790 (1977) [18 ref. En] [USDA, N. Regional Res. Cent., Peoria, Illinois 61604, USA]

Reverse phase high pressure liquid chromatography (HPLC) was investigated and found applicable for determining 6 aflatoxins. Aflatoxins M_2, M_1, G_2, G_1 and B_1 were completely resolved and B_2 was satisfactorily separated on a C18 (10 μm particle size, 4 mm × 30 cm) column with an eluting solvent of acetonitrile/water (35/65) at 1.5 ml/min. Compounds were detected by UV absorbance at 350 nm. Peak height and retention time reproducibility of multiple injections were excellent with coeff. of variation of 1.0% (M_1) and 1.9% (B_1) with constant laboratory temp. HPLC detn. of aflatoxin B_1 added to uncontaminated corn extracts at 20 and 50 ng/g levels were 83 ± 14 and 92.5 ± 8% respectively, of those added. Comparison of corn extract assays (6-98 ng B_1/g) by TLC and HPLC revealed that HPLC values averaged 25% less than TLC values. Numerous peaks and background interferences were present in corn extracts which made interpreting chromatograms difficult. Preparative HPLC was used to isolate and purify quantities of aflatoxins M_1, B_1 and G_1 from silicic acid column mixtures of M_1-M_2, B_1-B_2, and G_1-G_2. Separations were achieved on C18/Porasil B (35-75 μm) columns (3/8 in × 8 ft) developed with acetonitrile/water mixtures (M_1, 20/80; B_1, 35/65; G_1, 25/75) at 9.0 ml/min. These columns permitted isolation of 40 mg aflatoxin B_1 or G_1 in <3 h. Aflatoxin M_1 required 2 HPLC steps. AS

5

Survey of 1975 wheat and soybeans for aflatoxin, zearalenone, and ochratoxin.
Shotwell, O. L.; Goulden, M. L.; Bennett, G. A.; Plattner, R. D.; Hesseltine, C. W.
Journal of the Association of Official Analytical Chemists 60 (4) 778-783 (1977) [12 ref. En] [USDA, N. Regional Res. Cent., Peoria, Illinois 61604, USA]

Wheat samples (102 lots) were collected from Virginia, North Carolina, S. E. Missouri, S. Illinois and Kentucky. Soybean samples (180 lots) were collected from Virginia, Illinois, Iowa, Minnesota, Nebraska, Alabama, Arkansas and Texas. Samples of both commodities were analysed for zearalenone, aflatoxin and ochratoxin by the Eppley method. None of the 3 mycotoxins were detected in soybeans. Aflatoxins and ochratoxin A were not detected in wheat, but zearalenone was detected in 19 of 42 samples collected in Virginia. Half of the Virginia samples were collected because they were mould-damaged. Zearalenone levels ranged from 0.36 to 11.05 ppm; the identity of the zearalenone was confirmed by GLC and MS. Gibberella zea infection (6-60%) was detected in all of the zearalenone-positive samples; 6-60% of the kernels in the samples tested contained G. zea. AS

6

Control of pesticide residues and mycotoxins in food in the US and Canada.
Eades, J. F.
Farm and Food Research 8 (1) 9-10 (1977) [En] [Pesticide Residue & Analytical Services Unit, Oak Park Res. Cent., Carlow, Co. Carlow, Irish Republic]

Information on pesticide residues and mycotoxins in food, gathered on a visit to US and Canadian government agencies and other institutions in July/Aug., 1975, is discussed. Sampling of food and feed for pesticide residues, inspection of firms engaged in different aspects of the food industry, and the total diet concept for estimation of pesticide residues, are discussed. Of the mycotoxins found in food, the main interest centres around aflatoxin. VJG

7

High pressure liquid chromatographic determination of aflatoxins in wines and other liquid products.

Takahashi, D. M.

Journal of the Association of Official Analytical Chemists 60 (4) 799-804 (1977) [17 ref. En] [FDA, 50 United Nations Plaza, San Francisco, California 94108, USA]

A previously developed high pressure liquid chromatographic (HPLC) method [see FSTA (1977) 9 5H817] was evaluated by an extensive recovery study of aflatoxins from wines and other liquid products. The HPLC column and the preliminary cleanup procedures were both modified for this study. 4 aflatoxins (B_1, B_2, G_1, and G_2) were recovered at 80-116% from 28 samples of various liquid commodities spiked at the 1 μg/l. level. The detection limit of the proposed method for wines and fruit juices was about 0.02 μg/l. A total of 53 samples was analysed for aflatoxins during this study. AS

8

[Mycotoxins in musts and wines manufactured from apples contaminated with moulds.]

Pogorzelski, E.; Masior, M.; Czyzycki, A.; Lukawska-Pietrzak, Z.; Adamow-Piaszczynska, M.

Przemysl Fermentacyjny i Rolny 21 (5) 11-15 (1977) [20 ref. Pl, ru, en] [Inst. Tech. Fermentacji i Mikrobiologii Politechniki Lodzkiej, Lodz, Poland]

The effect of mould-contaminated apples on must quality was studied. The toxigenic moulds involved include 19 spp. of Aspergillus, 13 of Fusarium and 14 of Penicillium. To date, 8 fractions have been isolated: B_1, B_2, G_1, G_2, M_1, M_2 and B_{2a} and G_{2a}. The most toxic was B_1 and the least toxic B_2. During model experiments, 10-50% mould infested apples were used; must fermentation proceeded well, and the wine had good colloidal stability. The methanol content of the wines was 800 mg/l., vs. 93 mg/l. in wine produced entirely from sound apples. Wine produced from 50% contaminated apples contained approx. 15.5 μg aflatoxin B_1/l., approx. 31.0 μg aflatoxin G_1/l. and traces of aflatoxins B_2 and G_2. The same samples contained 15 mg patulin/l. STI

9

The occurrence of aflatoxin in nuts and nut products imported to Finland for human consumption during the years 1974-1976.

Pensala, O.; Niskanen, A.; Lahtinen, S.

Nordisk Veterinaermedicin 29 (7/8) 347-355 (1977) [31 ref. En, sv] [Biologinkuja 1, SF-02150 Espoo 15, Finland]

Data are given for the incidence and level of aflatoxin contamination of 1050 batches (a total of 4 690 728 kg) of nuts and nut products (e.g. marzipan) imported into Finland during the period 1974-1976. The results show that 44 batches (4.2%) were aflatoxin-positive; by wt., 323 453 kg (6.9% of the total) were aflatoxin-positive. The highest incidence of aflatoxin contamination was 37.6% by wt. for sliced and crushed groundnuts. Other products with a high incidence of aflatoxin contamination were whole raw groundnuts (12.2% by wt.), roasted groundnuts (2.2% by wt.), bitter almonds (17.5% by wt.) and mixed nuts (15.2%). Raw whole hazelnuts, marzipan and sweet almonds had low incidence of aflatoxins (<0.3% by wt.). Cashew nuts, walnuts, pecans and Brazil nuts were free from aflatoxins. The highest aflatoxin concn. recorded was 1522 μg/kg in a batch of groundnuts. In general, aflatoxin B_1 predominated, followed by aflatoxin B_2. The % aflatoxin-positive samples was 5.6% in 1974, 3.7% in 1975 and 3.4% in 1976. AJDW

10

Aspergillus flavus presence in silks and insects from developing and mature corn ears.

Fennell, D. I.; Kwolek, W. F.; Lillehoj, E. B.; Adams, G. A.; Bothast, R. J.; Zuber, M. S.; Calvert, O. H.; Guthrie, W. D.; Bockholt, A. J.; Manwiller, A.; Jellum, M. D.

Cereal Chemistry 54 (4) 770-778 (1977) [23 ref. En] [N. Regional Res. Cent., USDA, Peoria, Illinois 61604, USA]

In efforts to determine the origin of the inoculum responsible for A. flavus infection of corn before harvest, silks and insects from developing and mature ears of 2 corn hybrids grown at 6 locations were examined for the presence of the fungus. Incidence in silks varied by hybrid, location and state of maturity. A. flavus occurred in at least 1 silk sample from each location and was encountered more frequently on silks from mature ears than on those from immature ears collected at silking. From 1200 test ears, 3442 insects were collected. Distinct interactions were observed between the number and type of insects and the location, hybrid and sampling time. Insects, grouped in 5 broad categories, showed a relatively uniform presence of A. flavus ranging from 1.7 to 3.1%. Dissemination of the fungus was not related to the activities of a specific insect. Overall, 52% of A. flavus isolates from silk and 32% of those from insects produced aflatoxin in a qualitative test. Aflatoxin was detected in concn. ranging from 1 to 61 parts/billion in mature corn of both hybrids at 5 of the 6 locations. AS

11

[Occurrence and content of aflatoxin M_1 in commercial cheeses.] Über das Vorkommen und den Gehalt von Aflatoxin M_1 in Käsen des Handels.

Kiermeier, F.; Weiss, G.; Behringer, G.; Miller, M.

Zeitschrift für Lebensmittel-Untersuchung und -Forschung 163 (4) 268-271 (1977) [15 ref. De, en] [Süddeutsche Versuchs- & Forschungsanstalt für Milchwirtschaft, Vöttinger Strasse 45, D-5050 Freising-Weihenstephan, Federal Republic of Germany]

Aflatoxin M_1 was found in 136 (69%) of 197 commercial cheese samples tested between May and Aug. 1976; levels ranged from 0.02 to 0.23 µg/kg (mean 0.09 µg/kg), with 117 of the positive samples containing <0.1 µg/kg. Aflatoxin was found in only 57% of cream cheese samples, compared with 83-85% of semi-hard and hard cheese samples. The cheese varieties most frequently containing aflatoxin M_1 were Chester (Cheddar-type) (100% of samples), Edelpilzkäse (blue cheese) (100%) and Edam (97%); those least frequently contaminated were Weinkäse Limburger-type cheese (43% of samples) and Camembert (50%). There tended to be more aflatoxin-positive cheese samples during the spring season when dairy cows were receiving supplemental concentrate feeds, and less when cows were grazing pasture. CDP

12

[Influence of cooling temperatures on aflatoxin formation in milk products.] Einfluss von Kühltemperaturen auf die Aflatoxin-Entwicklung bei Milchprodukten.
Kiermeier, F.; Behringer, G.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 164 (4) 283-285 (1977) [17 ref. De, en] [Chem. & Physikalisches Inst., Süddeutsche Versuchs- & Forschungsanstalt für Milchwirtschaft, Tech. Univ. München, Weihenstephan, Federal Republic of Germany]

Pastes made from dried milk and cheese powder artificially contaminated with Aspergillus parasiticus were stored for 28 days at 1°, 5°, 10° and 20°C, at 90-95% RH. Even at 1°C, the aflatoxins B_1, B_2, G_1, G_2 and M_1 could be quantitatively determined after 28 days, despite assertions in the literature that low-temp. storage prevents aflatoxin formation. Addition of lactose (0-40%) did not significantly affect aflatoxin formation in artificially contaminated Tilsit cheese paste stored for $\leqslant$21 days at 5°C. Even storage of quarg and Camembert cheese in 10% salt solution did not inhibit aflatoxin production during $\leqslant$28 days at 20°C. ADL

13

Thin layer chromatographic determination of aflatoxin B_1 in eggs.
Trucksess, M. W.; Stoloff, L.; Pons, W. A., Jr.; Cucullu, A. F.; Lee, L. S.; Franz, A. O., Jr.
Journal of the Association of Official Analytical Chemists 60 (4) 795-798 (1977) [8 ref. En] [Div. of Food Tech., FDA, Washington, DC 20204, USA]

A method for determining aflatoxin in dairy products [see FSTA (1974) 6 4P449] was modified for eggs, initially by additional cleanup steps. The modified method proved practical for use in survey analyses and was sufficiently sensitive to detect aflatoxin B_1 at levels <1 ng/g in eggs from hens on experimentally contaminated feed and in spiked eggs; interfering compounds in eggs received from many different producing areas were eliminated. Although recovery was >75% when the aflatoxin was extracted immediately after spiking, recovery was usually <30% when the aflatoxin was extracted after more than 24 h. Adding NaCl, Na_2SO_4 or urea to the extracting solvent remedied this defect, which is thought to be related to the binding of aflatoxin to egg protein. AS

14

[Significance of mycotoxins from the health point of view.] Zur gesundheitlichen Bedeutung der Mykotoxine. [Review]
Roll, R.
Zeitschrift für das Gesamte Lebensmittelrecht (ZLR) 4 (2) 187-198 (1977) [40 ref. De, en, fr]

15

[High-performance liquid chromatography.]
Karleskind, A.
Revue Francaise des Corps Gras 24 (8/9) 419-425 (1977) [Fr, en, de, es] [Lab. Wolff, Paris, France]

Recent advances in liquid chromatography resulting from improved instrumentation (pumps and detectors) and very fine particle supports (5-10 µm diam.), allowing more efficient separation, and their applications to fat analysis are briefly discussed. Thus column chromatography, which has become high performance liquid chromatography (HPLC), is especially useful for studying high mol. wt. and heat-labile compounds, for detn. of aflatoxins, and for glyceride analysis. Results obtained by this method are shown graphically and in tables. Considerably greater accuracy was obtained by HPLC than by TLC detn. of aflatoxin in groundnut presscakes, i.e. coeff. of variation (4 samples, 5 replicates each) were 3.6-8.6%, vs. 18.3-42.8 by TLC. The excellent separation of glycerides according to their degree of unsaturation suggests successful industrial applications for oil fractionation. RM

16

[Aflatoxin contents in packaged groundnuts.] Aflatoxingehalte in Fertigpackungen mit Erdnusskernen.
Hanssen, E.; Birn, K.; Jung, M.
Lebensmittelchemie und Gerichtliche Chemie 31 (5) 88-90 (1977) [14 ref. De] [H. Bahlsens Keksfabrik KG, 3000 Hannover, Federal Republic of Germany]

Problems with sampling of groundnuts for detn. of aflatoxins are discussed, with special reference to disagreements resulting from the different sampling principles used by importers or processers (examination of a random sample from a well-mixed batch) and by official food control authorities (examination of individual packages). It is suggested that these differences should be eliminated, e.g. by all parties basing their analyses on a large comminuted well mixed sample (e.g. 10-22 kg). Tables of literature data for aflatoxin concn. in groundnuts are given, together with several values for hazelnuts. AJDW

17

[Sampling of cheese for aflatoxins.] Probenahme bei Aflatoxin verdächtigen Käsen.
Kiermeier, F.; Behringer, G.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **165** (1) 30-33 (1977) [7 ref. De, en] [Süddeutsche Versuchs- & Forschungsanstalt für Milchwirtschaft, D-8050 Freising-Weihenstephan, Federal Republic of Germany]

On the basis of experiments with Provolone and Tilsit cheeses, which were stored for <52 days after inoculation with Aspergillus parasiticus and A. flavus spore suspensions, the following procedure is recommended as the most reliable sampling method: (i) detn. of the aflatoxin content of scrapings from 100 cm^2 of the cheese surface; and (ii) bore sampling at several points of the cheese if the scrapings have a high aflatoxin content (about 20-30 μg/kg). Frequent washing of Tilsit cheese appeared to cause diffusion of the aflatoxins throughout the surface layer of the cheese. ADL

18

Effects of hypochlorite treatments on a methionyl peptide.
Cuq, J. L.; Azmard, C.; Cheftel, C.
Food Chemistry **2** (4) 309-314 (1977) [4 ref. En] [Lab. de Biochimie & Tech. Alimentaire, Univ. des Sci. & Tech. du Languedoc, 34060 Montpelier, France]

The effects of hypochlorite detoxication of aflatoxin-contaminated protein meals and isolates on methionine residues was studied in model experiments. Treating 5 mM glycyl-L-methionyl glycine (corresponding to methionine concn. in peanut protein isolates) with <0.4% w/v NaOCl caused oxidation of methionine to its sulphoxide and sulphone, and probable deamination of free α-amino groups. Effects of NaOCl treatment on tryptophamyl and lysyl peptides are under investigation. RM

19

[Moulds in modern nutrition.]
Ligugnana, S.
Tecnica Molitoria **28** (9) 164-167 (1977) [It]

Aspects discussed include: beneficial activity of moulds in the manufacture of various foods; contamination of foods by moulds; formation of mycotoxins; cleaning and disinfection of walls, ceilings, etc. in food processing and handling establishments, to control moulds; and prevention of contamination of food with moulds from the air. AJDW

20

Comparative study of the fluorescent characteristics of solutions of aflatoxins and palmotoxins in chloroform.
Uwaifo, A. O.; Emerole, G. O.; Bassir, O.
Journal of Agricultural and Food Chemistry **25** (5) 1218-1220 (1977) [15 ref. En] [Dep. of Biochem., Univ. of Ibadan, Ibadan, Nigeria]

Palmotoxins B_0 and G_0 and aflatoxins B_1, B_2, G_1, G_2, and B_3 were all excited in chloroform at a wavelength of 365 nm. Their fluorescence emission max. fell within the wavelength range 410-430 nm. The fluorescence of aflatoxins and palmotoxins in descending order of intensity is as follows: $G_2 > G_1 > G_0 > B_3 > B_0 > B_2 > B_1$. The UV absorption max. for the aflatoxins and palmotoxins used are recorded. AS

21

Partial characterization of the mode of action of benzoic acid on aflatoxin biosynthesis.
Uraih, N.; Cassity, T. R.; Chipley, J. R.
Canadian Journal of Microbiology **23** (11) 1580-1584 (1977) [16 ref. En, fr] [Dep. of Poultry Sci., Ohio State Univ., Columbus, Ohio 43210, USA]

Aflatoxin production by a toxigenic strain of Aspergillus flavus was greatly reduced by benzoic acid and sodium benzoate in synthetic media. Reduction was accompanied by the appearance of a yellow pigment. Spectral analyses partially characterized this pigment as closely related to an acetyl derivative of a versiconal-type compound. A cell-free extract prepared from A. flavus grown in synthetic media was active in converting this yellow compound into aflatoxin B_1 in the presence of NADPH at 25°C (pH 7.4). In the presence of benzoic acid and its salt or autoclaved cell-free extract, conversion of yellow compound to aflatoxin B_1 was prevented. These results suggest that the yellow compound is an intermediate in the secondary metabolic cycle involved in aflatoxin B_1 production. Benzoic acid, sodium benzoate, or autoclaving the cell-free extract appear to have resp. blocked or denatured an enzymic step late in the biosynthetic pathway of aflatoxin B_1. AS

22

Production and stability of aflatoxins, penicillic acid and patulin in several substrates.
Lieu, F. Y.; Bullerman, L. B.
Journal of Food Science **42** (5) 1222-1224, 1228 (1977) [32 ref. En] [Dep. of Food Sci. & Tech., Univ. of Nebraska, Lincoln, Nebraska 68583, USA]

Aflatoxins B_1 and G_1, penicillic acid and patulin were each added to Swiss cheese, bologna and cooked cornmeal. The samples were stored at 5°C for 15 min and 3, 12, 24, 48, 120 and 168 h before extraction and recovery of the added toxins. Aflatoxins B_1 and G_1 were stable in the foods during the entire storage period. Patulin and penicillic acid were undetectable in bologna after 12 and 48 h storage, resp. In Swiss cheese, after 168 h of storage at 5°C, 8% of the original penicillic acid remained. With cooked cornmeal, about 80% of the patulin and of the penicillic acid were detected after 168 h of storage at 5°C. Growth and experimental toxin production on several substrates were studied by using known toxinogenic strains of Aspergillus flavus, Penicillium patulum and a Penicillium sp. incubated at 5°, 12° and 25°C for 6, 4 and 2 wk resp. No growth of A. flavus or aflatoxin production was observed at 5° C and 12° C on any substrate, but at 25° C, growth and aflatoxin production occurred on Swiss cheese, bologna, cooked cornmeal, Mozzarella cheese and bacon. Patulin and penicillic acid were produced in cooked cornmeal at all 3 temp., but were not found in the other food substrates, except for a small amount of penicillic acid in one of the muffin samples at 5° C, even though the moulds grew extensively on all substrates at all 3 temp.   IFT

23

Method for obtaining aflatoxin-free food products.
Carmona, J. Y. Marasigan, M. P.
United States Patent 4 035 518 (1977) [En]

Whole seed grains and whole or split nut kernels substantially free from aflatoxin are subjected to a weakly alkaline aqueous solution maintained at an elevated temp. (180-213° F) for a short period of time and washed with water until the effluent is pH neutral. The aflatoxin contaminated food is separated from the uncontaminated food, which can be further processed for consumption.   GL

24

Aflatoxin in corn: evaluation of filter fluorometer reading of minicolumns.
Shotwell, O. L.; Goulden, M. L.; Kwolek, W. F.
Journal of the Association of Official Analytical Chemists 60 (5) 1220-1222 (1977) [11 ref. En] [USDA, N. Regional Res. Cent., Peoria, Illinois 61604, USA]

A minicolumn method using a filter fluorometer was compared with TLC for determining aflatoxin in corn. The minicolumn-fluorometer method identified many more samples as aflatoxin-positive than the AOAC approved method. Some corn samples contain a blue-fluorescing substance that interferes with minicolumn chromatography of aflatoxins. Aflatoxin levels measured by the minicolumn-fluorometer method did not correspond to those obtained by the AOAC method.   AS

25

Safety of Penicillium caseicolum, P. camemberti and P. roqueforti for human health. I. Physico-chemical methods for measuring known mycotoxins. Die gesundheitliche Unbedenklichkeit von Penicillium caseicolum, P. camemberti und P. roqueforti: I. Prüfung auf Bildung bekannter Mykotoxine mit physikalisch-chemischen Methoden.
Engel, G. von; Milczewski, K. E. von
Milchwissenschaft 32 (9) 517-520 (1977) [33 ref. De, en] [Inst. für Mikrobiol. der Bundesanstalt für Milchforschung, Kiel, Federal Republic of Germany]

36 strains of P. caseicolum, 5 of P. camemberti, and 17 of P. roqueforti were tested for their ability to form aflatoxins B_1, B_2, G_1, G_2 and M_1, sterigmatocystin, diacetoxyscirpenol, ochratoxin A, patulin, penicillic acid, citrinin, and citreoviridin; surface cultures of the individual strains in yeast extract/sucrose were incubated for 10-14 days at 27° C and extracted with acetonitrile/chloroform at pH 1.5. After TLC the conc. extracts were examined spectrometrically. No mycotoxins were produced by any of the 3 Penicillium spp. tested.
AS

26

Bovine liver metabolism and tissue distribution of aflatoxin B_1.
Hayes, J. R.; Polan, C. E.; Campbell, T. C.
Journal of Agricultural and Food Chemistry 25 (5) 1189-1193 (1977) [41 ref. En] [Div. of Nutr. Sci., Cornell Univ., Ithaca, New York 14853, USA]

As part of a study of aflatoxin metabolism, aflatoxin B_1 was fed to lactating dairy cows at levels of 10, 50, 250 and 1250 µg/kg concentrate. 24 h before slaughter, $[^3H]$-aflatoxin B_1 was fed as part of the dose. Tissue levels of chloroform-soluble aflatoxins from a cow fed at the 1250 µg/kg level were (µg/kg): kidney, B_1 0.22, M_1 0.72; liver, B_1 0.09, M_1 0.16; and mammary gland, B_1 none detectable, M_1 0.27. No chloroform-soluble aflatoxins were detectable in skeletal muscle, or in tissues from cows fed at lower levels. The distribution of recovered counts from chloroform extracts is tabulated for various tissues from a cow fed at the 1250 µg/kg level; unidentified aflatoxin metabolites in these extracts are not thought to be a potential hazard to humans, but the hazard of water-soluble aflatoxin metabolites remains to be characterized.   DIH

27

Inhibition of growth and aflatoxin production by cinnamon and clove oils, cinnamic aldehyde and eugenol.
Bullerman, L. B.; Lieu, F. Y.; Seier, S. A.
Journal of Food Science 42 (4) 1107-1109, 1116 (1977) [15 ref. En] [Dep. of Food Sci. & Tech., Univ. of Nebraska, Lincoln, Nebraska 68583, USA]

The objective of this study was to determine the specific components of cinnamon and cloves that may be effective against mould growth and toxin production. The effects of cinnamon oil, clove oil, cinnamic aldehyde and eugenol on growth and aflatoxin production by Aspergillus parasiticus were studied using yeast-extract sucrose broth as the substrate. All 4 substances inhibited mould growth and subsequent toxin production. Cinnamon and clove oils were inhibitory at 200-250 p.p.m., cinnamic aldehyde at 150 p.p.m. and eugenol at 125 p.p.m. Since cinnamic aldehyde and eugenol are the respective major components of cinnamon and clove oils, it was concluded that these are the major active antifungal ingredients of these 2 essential oils. The inhibitory effect of these substances was judged to be inhibition of growth rather than of toxin production. When growth occurred after a delay, aflatoxin production occurred when the cultures reached secondary metabolism. Given sufficient time, cultures which were inhibited initially, but which subsequently grew, produced toxin levels equivalent to control cultures. Levels of the oils >250 p.p.m. and of cinnamic aldehyde and eugenol >200 p.p.m. completely inhibited mould growth, or permitted only a small amount of growth that never reached secondary metabolism and never produced aflatoxins during the 3-wk incubation period. IFT

28

[Detection of aflatoxins in some Korean foodstuffs.]
Kim, Y.-H.; Hwangbo, J.-S.; Lee, S.-R.
Korean Journal of Food Science and Technology 9 (1) 73-80 (1977) [20 ref. Ko, en]
[Environmental Chem. Lab., Korea Atomic Energy Res. Inst., Seoul, Korea]

54 samples of Meju (a naturally inoculated soybean substrate for soy sauce and paste fermentation), 125 samples of Doenjang (a Korean style fermented soybean paste), both produced at household level, and 31 samples of groundnuts were collected from 8 major cities of South Korea and subjected to aflatoxin assay by the AOAC method. Results showed that frequencies for the occurrence of aflatoxins in Meju, Doenjang and groundnuts were 7.4% (4 of 54), 8.8% (11 of 125) and 0 (none of 31) resp. A Doenjang sample from Busan was found to have the highest content of aflatoxins; concn. of aflatoxins B_1, B_2, G_1 and G_2 were 66, 13, 0 and 5 parts/billion, resp., while in other samples only aflatoxin G_2 was detected. Aflatoxin B_1, isolated from the Doenjang sample from Busan, was confirmed by TLC, derivative formation and chicken embryo bioassay. [From En summ.] SP

29

Process for the removal of aflatoxin from cereals, oil seed and feedstuffs.
Yano, N.; Fukinbara, I.; Yoshida, K.; Korenaga, T. (Kasei Kogyo Co. Ltd.)
United States Patent 4 055 674 (1977) [En]

Aflatoxin contents of cereals, oilseeds and feeds are reduced to $\leq$ 15 parts/billion by extraction with a mixed solvent system of liquid dimethyl ether and 2-8 wt. % water at a temp. below that at which any protein thermally denatures. The spent solvent system is regenerated by bringing it into contact with activated C. GL

30

A coconut-agar medium for rapid detection of aflatoxin production by Aspergillus spp.
Lin, M. T.; Dianese, J. C.
Phytopathology 66 (12) 1466-1469 (1976) [13 ref. En] [Dep. of Plant Biol., Univ. of Brasilia, Brasilia, 70 000 DF, Brazil]

An agar medium containing commercial coconut extracts and with a pH of 6.9 was developed for detection of aflatoxin production by Aspergillus spp. On this medium, aflatoxin-positive isolates showed characteristic blue of blue-green fluorescence in agar surrounding the colonies under UV light. Fluorescence produced by strong aflatoxin producers began to appear within 32 h after transfer to the medium; fluorescence intensity increased with prolonged incubation. An incubation time of 3 days was sufficient for detection of weak aflatoxin production. Several known aflatoxin promotors either had no effect or decreased the production of fluorescence. Incubation at 20°C slightly reduced the intensity of fluorescence; no difference was observed at 24°, 28° or 32°C. 7 of 27 Brazilian isolates of the A. flavus group were aflatoxin-positive; this was confirmed by TLC assay of culture broths. An orange-yellow pigmentation on the coconut-agar medium was consistently associated with the production of fluorescence and the aflatoxin-producing ability of Aspergillus spp. The pigmentation can be used to identify aflatoxin-positive isolates without the use of UV light. AS

31

[Biological detection test of aflatoxin B_1 and patulin mycotoxins using Bacillus thuringiensis.]
Boutibonnes, P.; Jacquet, J.
Bulletin de l'Academie Veterinaire de France 49 (4) 491-502 (1976) [27 ref. Fr] [Lab. de Physiologie Bacterienne II, Univ. de Caen, 14032 Caen, France]

Biological tests to ascertain the effect of (i) coumarin and related molecules, (ii) S compounds (cysteine, cystine, thiourea and sodium thiosulphate and thioglycollate), and (iii) steroid hormones on the cytotoxic powers of mycotoxins (aflatoxin B_1 and patulin) were carried out using B. thuringiensis. Double soaking (2 × 20 μl doses on No. 1 Whatman filter paper strips) and direct contact (5 or 10 μg doses) methods were used with both mycotoxins, together with (i), (ii) or (iii) on cultures in a solid medium. Whereas B. thuringiensis was sensitive to both mycotoxins alone (2 μg/ml inhibited growth completely in either case), (i) inhibited antibacterial activity of aflatoxin B_1, and (ii) inhibited that of patulin; (iii) had no effect. It is concluded that biochemical control of foodstuffs should be coupled with biological tests for distinguishing natural compounds so as to improve hygienic standards. KME

32

Microbial protein from corn waste.
Rajagopal, M. V.
Journal of Food Technology 12 (6) 633-637 (1977) [5 ref. En] [Dep. of Microbiol., Univ. of Nigeria, Nsukka, Nigeria]

Aspergillus fumigatus, A. flavus, A. niger and A. tamarri were grown in batch fermentations with hydrolysed or unhydrolysed corn cob waste as the sole C source. Total protein yields after 19 days fermentation were in the range 7.13-9.75% (% of initial carbohydrate). A. fumigatus and A. tamarri gave the highest total protein yields with unhydrolysed corn cob waste. Preliminary results of fluorometry did not show the presence of aflatoxin in protein recovered from the fermentations. DIH

33

[Sample size for determination of aflatoxins in groundnuts.] Stichprobengrösse für die Bestimmung von Aflatoxin in Erdnüssen.
Waibel, J.
Deutsche Lebensmittel-Rundschau 73 (11) 353-357 (1977) [8 ref. De, en, fr] [NATEC Gesellschaft für Naturwissenschaftlich-Tech. Dienste mbH, Behringstrasse 154, D-2000 Hamburg 50, Federal Republic of Germany]

Problems of sampling of groundnuts for aflatoxin detn. are discussed, with reference to the 1976 legislation setting tolerances for aflatoxins in foods. Problems include the relative rarity of contaminated nuts (e.g. 1 in 10 000), and the considerable variation in aflatoxin concn. in contaminated nuts. A statistical study on optimization of sample size is described. Tables of data are given showing the likelihood of negative results with sample of 60 g-60 kg with samples of groundnuts with contaminated:sound nut ratios of 1:4000, 1:10 000 and 1:30 000, and the probability of various aflatoxin concn. in various sample sizes, as a proportion of the aflatoxin concn. in the total batch. A sample size ≥5 kg is recommended for random checks by groundnut processors. Random sampling of commercially available groundnuts by official quality control organizations is also discussed. AJDW

34

The significance of aflatoxins in the dairy industry. [Review]
Kiermeier, F.
Annual Bulletin, International Dairy Federation No. 98, 45pp. (1977) [101 ref. En, Fr] [Süddeutsche Versuchs- & Forschungsanstalt für Milchwirtschaft, Weihenstephan, Federal Republic of Germany]

In this review article, the author gives a brief account of the toxicity of aflatoxins, and then considers in more detail factors which influence the occurrence of aflatoxins in milk; these include direct contamination of milk products by moulds capable of synthesizing aflatoxins, and indirect contamination from feedstuffs containing high levels of aflatoxin. Effects of processing on the aflatoxin present in cows' milk are also described, and measures that can be taken to protect dairy products from contamination with aflatoxins are discussed. MEG

35

[The concept of comprehensive analysis in food control.] Der Begriff der umfassenden Analyse in der Lebensmittelkontrolle.
Battaglia, R.; Romann, E.
Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 68 (4) 497-503 (1977) [1 ref. De, en, fr] [Kantonales Lab. Zürich, Fehrenstrasse 15, Postfach CH 8030, Zürich, Switzerland]

The term 'analysis' is redefined on a broader basis than the simple chemical detn. of a compound within a sample. 'Analysis' should include the analysis of information and decision-making processes, so that the whole manufacturing process of a particular foodstuff is considered before the decision is made what to analyse and for what reason. Measures taken after chemical detn., such as impounding dangerous foods, are considered part of the analytical process. The concepts discussed are illustrated with an example of aflatoxin contamination of ground almonds imported into Switzerland. DIH

36

The use of fungal protoplasts in the study of aflatoxin biosynthesis.
Dutton, M. F.; Anderson, M. S.
Experientia 34 (1) 22-24 (1978) [17 ref. En] [Dep. of Life Sci., Trent Polytech., Burton Street, Nottingham, UK]

Protoplasts derived from Aspergillus flavus are capable of synthesizing aflatoxins when incubated in a chemically defined medium. ^{14}C-acetate and ^{14}C-versicolorin A, added to protoplasts from 3-day-old mycelium, are incorporated into aflatoxin B_1. AS

37

A rapid and semiquantitative method for determining aflatoxin in grain.
Randall, G. M.; Bird, F. H.
Research in the Life Sciences 25 (3) 5pp. (1977) [4 ref. En] [Life Sci. & Agric. Exp. Sta., Univ. of Maine, Orono, Maine, USA]

The procedure combines the simplified extraction method developed by Holaday [FSTA (1977) 9 3C103] with a rapid minicolumn chromatographic procedure developed by Velasco [FSTA (1972) 4 7C166]. The method was made semi-quantitative by the use of serial dilutions of the extract to the point of loss of visible fluorescence. Sensitivity for aflatoxin B_1 is 2-3 parts/billion. Total time taken for extraction is <10 min and for chromatography about 5 min if vacuum is not used. Estimated recoveries from grain contaminated at known levels from 500 to 5000 parts/billion were within ±20% of those expected. AL

38

[Effect of asbestos content and filtration volume on the adsorptive behaviour of filter sheets towards aflatoxin B_1.] Der Einfluss des Asbestanteils und des Filtrationsvolumens auf das Adsorptionsverhalten von Filterschichten gegenüber Aflatoxin B_1.
Postel, W.; Görg, A.
Brauwissenschaft 30 (10) 312-314 (1977) [3 ref. De, en, fr] [Lehrstuhl für Allgemeine Lebensmitteltech., Tech. Univ. München, 8050 Freising-Weihenstephan, Federal Republic of Germany]

Filtration trials with model solutions containing aflatoxin-B_1 revealed that the adsorptive behaviour of filter sheets is dependent on their asbestos content. The amount of asbestos in a filter sheet and its absorptive power are proportional to one another; the higher the amount of asbestos the greater is the adsorptive power. Results showed that with 100% asbestos, 88% of the aflatoxin-B_1 was adsorbed; with 20% asbestos, 22% of the aflatoxin-B_1 was adsorbed. However, adsorptive power of the asbestos filter sheets towards aflatoxin-B_1 decreased with increasing filtrate vol., fluctuating to a level depending on the asbestos level in the filter sheets. TUB-IGB

39

Native Iranian peanut resistance to seed infection by Aspergillus.
Tavasolian, B.
Journal of Agricultural and Food Chemistry 25 (6) 1422-1423 (1977) [15 ref. En] [Dep. of Nutr., School of Pharmacy, Univ. of Tehran, Tehran, Iran]

The concn. of aflatoxin in 3 var. of peanuts cultivated in Iran were measured by the AOAC method and a millicolumn method [see FSTA (1973) 5 12J1964], resp., and were found to be: in Local Gilan Iran, 0 by both methods; Flori Spanish 334 A, 12.5 and 10 (parts/billion); and Georgia 119-20, 60.50 and 50. The importance of a var. resistant to aflatoxin infection is discussed. DIH

40

Screening method for the detection of aflatoxins, ochratoxin, patulin, sterigmatocystin, and zearalenone in cereals.
Josefsson, B. G. E.; Möller, T. E.
Journal of the Association of Official Analytical Chemists 60 (6) 1369-1371 (1977) [13 ref. En] [Swedish Nat. Food Admin., Food Lab., S-751 26 Uppsala, Sweden]

A 50-g cereal meal sample is extracted by shaking with 25 ml 0.1M H_3PO_4 + 250 ml chloroform. Corn meal samples are extracted in a high speed blender, not by shaking. The extract is filtered and 25 ml filtrate is evaporated to 0.25 ml. This is cleaned up by chromatography on Sephadex LH-20 using chloroform/methanol (2 + 1) as eluent. For a 59 cm × 15 mm column, a fraction between 53 and 75 ml is collected for detn. of all the mycotoxins named in the title, except patulin (PT), for which a fraction between 76 and 90 ml is collected. After evaporation to near dryness, each fraction is dissolved in 100 µl chloroform. 5-20 µl spots are applied to a TLC plate which is developed once in benzene/hexane (3 + 1) (mycotoxins remain at origin) and once in benzene/ethyl acetate/formic acid (80 + 20 + 0.5). PT is determined on a separate plate developed in the 2nd solvent system. Lowest detectable levels in meals of wheat, barley, rye, oats and corn are: aflatoxins, 5 µg/kg; ochratoxin A, 10 µg/kg; PT, 50 µg/kg; sterigmatocystin, 10 µg/kg; and zearalenone, 35 µg/kg. DIH

41

Evaluation of cottonseed aflatoxin testing programs.
Whitaker, T. B.; Whitten, M. E.
Journal of the American Oil Chemists' Society 54 (10) 436-441 (1977) [8 ref. En] [USDA, N. Carolina State Univ., Raleigh, N. Carolina 27607, USA]

A computer model was developed to simulate cottonseed aflatoxin testing programmes. By use of the model, probabilities of obtaining certain aflatoxin test results for various lot concn. and sample sizes were determined. Also, the effects of sample size and the definition of good and bad sample quality on the probability of lot acceptance were demonstrated. AS

42

[Problems with legislation covering tolerances for aflatoxins in foods.] Zur Problematik von Höchstmengenregelungen für Aflatoxine in Lebensmitteln.
Mücke, W.
Lebensmittelchemie und Gerichtliche Chemie 31 (6) 109-110 (1977) [De] [Kleiststrasse 20, 8012 Ottobrunn, Federal Republic of Germany]

The Regulations Establishing Tolerances for Aflatoxins in Foods, which came into force in the Federal Republic of Germany on 1 March 1977, are briefly discussed. Aspects considered include: the need for official tolerances for this class of carcinogen; problems of establishment of tolerances bearing a reasonable relationship to the toxicity of aflatoxins; problems with the different toxicity values of the individual aflatoxin fractions; the desirability of specification of techniques for confirmation of the identity of aflatoxins; the lack of an official standard sampling procedure; and the desirability of establishment of tolerances for aflatoxins in other foods, including foods of animal origin. AJDW

43

Aflatoxin contamination of milk. Establishment of action level.
United States of America, Food & Drug Administration
Federal Register 42 (234, Dec. 6) 61630 (1977) [En] [Washington, DC, USA]

Aflatoxin contamination of milk in at least 4 Southeastern states is a potentially serious public health problem. FDA has therefore established a 0.5 µg/kg action level for aflatoxin M_1 contamination of fluid milk products. CAS

44

Differences between Aspergillus flavus strains in growth and aflatoxin B_1 production in relation to water activity and temperature.
Northolt, M. D.; Egmond, H. P. van; Paulsch, W. E.

Journal of Food Protection 40 (11) 778-781 (1977) [9 ref. En] [Lab. voor Zoönosen en Levensmiddelmicrobiologie, Rijksinst. voor de Volksgezondheid, Bilthoven, Netherlands]

The optimum and limiting conditions of water activity (a_w) and temp. for growth of, and aflatoxin B_1 production by, various Aspergillus flavus strains were determined. Agar media were used in which the a_w was adjusted by addition of sucrose or glycerin. Optimum temp. for aflatoxin B_1 production at high a_w were for the 3 toxigenic strains tested 13-16°, 16-24° and 31°C. Strains with a low temp. optimum for aflatoxin B_1 production showed fast growth at 37°C without aflatoxin B_1 production. A reduced a_w (<0.95) together with a moderate or low temp. inhibited toxin production more than growth. However, at a high temp. (37°C) one strain showed stimulation of aflatoxin B_1 production on the glycerin medium at reduced a_w. No differences were noted between aflatoxin-positive and aflatoxin-negative strains with respect to growth under various conditions. AS

45

The metabolic activation of chemical carcinogens - recent results with aromatic amines, safrole and aflatoxin B_1. [Lecture]
Miller, J. A.; Miller, E. C.
IARC Scientific Publications No. 12, 153-180 (1976) [83 ref. En] [McArdle Lab. for Cancer Res., Univ. of Wisconsin Med. Cent., Madison, Wisconsin, USA]

Metabolic activation of aromatic amines and amines, safrole (a representative of a large group of naturally occurring allyl and propenyl arenes which occur widely in essential oils and spices) and aflatoxin B_1 are discussed. New data on the metabolic activation of MAB (N-methyl-4-aminoazobenzene), safrole and aflatoxin B_1 amplify and support the generalization on the strong electrophilic nature of ultimate chemical carcinogens. [See FSTA (1978) 10 6C203.] AL

46

Removal of aflatoxin from peanuts.
Lingquist, R. H. (Chevron Research Co.)
United States Patent 4 062 984 (1977) [En]

Aflatoxins are extracted from cleaned and hulled seeds or nuts with methoxymethane. IFT

47

Destruction of aflatoxins during fermentation and by-product isolation from artificially contaminated grains.
Dam, R.; Tam, S. W.; Satterlee, L. D.
Cereal Chemistry 54 (3) 705-712 (1977) [En] [Lab. of Agric. Biochem., Inst. Agric. & Natural Resources, Univ. of Nebraska, Lincoln, Nebraska 68583, USA]

Aflatoxins B_1, B_2, G_1, and G_2 were added to corn, wheat, and corn-milo fermentation mixtures at levels of 1000 µg each/100 g grain mixture. The degree to which aflatoxins would persist during fermentation, isolation of distiller's protein concentrate, and by-products such as residue, syrup, and whey were then determined. The data indicated a loss after fermentation of slightly >60%. Further process treatments involved in the isolation of distiller's protein concentrate led to a destruction of total aflatoxins in excess of 90%. AS

48

[Aflatoxin contents in extracted oilseed residues and reliability of its determination.] Ein Beitrag zum Gehalt von Aflatoxin in Ölsaatrückständen und zur Zuverlässigkeit seiner Identifizierung.
Dietrich, H.; Hoffmann, G.
Landwirtschaftliche Forschung 31 (1) 19-25 (1978) [8 ref. De, en, fr] [Staatliche Landwirtschaftliche Untersuchungs- und Forschungsanstalt Augustenberg, Nesslerstrasse 23, D-7500 Karlsruhe 41, Federal Republic of Germany]

Analysis of 93 samples of extracted oilseed residues showed mean aflatoxin concn. (max. in parentheses) of 33 parts/billion (80) in coconut, 15 (30) in palm kernel, 63 (1 sample only) in Babassu, 26 (75) in cottonseed, <5 (5) in sunflower, <5 (<5) in linseed and 5 (20) in maize germ; no detectable aflatoxin was found in sesame, rapeseed and wheat germ residues. These results contrast with a mean 530 parts/billion in groundnuts. Interferences with the detn. by fluorescent compounds with similar R_f values on TLC as listed by Gedek & Kahlau [Zentralblatt für Veterinärmedizin, B (1976) 23, 216-229], only rarely cause errors during routine analyses due to improvements in the method. RM

49

[Potential mycotoxin producers in dried milks for infants.] Zur Problematik der potentiellen Mykotoxinproduzenten in Milchpulvern für Kleinstkinder.
Jesenska, Z.; Polakova, O.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 166 (1) 1-4 (1978) [38 ref. De, en] [Res. Inst. for Hygiene, Ul. Cs. Armady 10, 882 01 Bratislava, Czechoslovakia]

11 119 colonies of 29 genera of moulds were isolated from 4950 g dried milk for infant feeding, produced in Czechoslovakia (5 brands in 7 original packages) or in other countries (4 brands in 8 original packages). Average colony count/g was 1.9 for the Czechoslovak samples and 0.1 for the other samples. From one Czechoslovak sample 5402 mould colonies were isolated (18 colonies/g), of which 99.4% were Penicillium spp. and 84% were isolated from the 2 top layers of the original package. In the remaining samples the moulds were evenly distributed. 83% of all colonies belonged to the genera Cladosporium, Penicillium and Alternaria. Certain species were potential mycotoxin producers. The results are discussed in relation to the recent finding of aflatoxin B_1 in the livers of deceased infants in Czechoslovakia, and attention is drawn to the need for re-appraisal of microbiological standards and methods of manufacture and packaging for dried milk products

50

Brazil nuts, pistachio nuts, and other foods and feeds. Availability of guidelines.
United States of America, Food & Drug Administration
Federal Register 43 (11, Jan. 17) 2444-2445 (1978) [En] [Washington, DC, USA]

Confirmation of aflatoxin B_1 by chemical derivative has, without exception since 1964, been corroborated by the chicken embryo bioassay. Thus the chemical test can stand alone as the confirmatory test for aflatoxin for Brazil nuts, pistachio nuts, coconut meal, copra, corn and corn products, and cottonseed meal.   CAS

51

Third International IUPAC Symposium on mycotoxins in foodstuffs. [Conference proceedings]
International Union for Pure & Applied Chemistry
Pure and Applied Chemistry 49 (11) 1703-1778 (1977) [many ref. En]

Part of this issue of the journal contains invited lectures presented at the Third International IUPAC Symposium on mycotoxins in foodstuffs, held at Paris, France, on 16-18 Sept. 1976. Papers include: Food mycotoxins survey and monitoring programs, by A. D. Campbell (pp. 1703-1707, 21 ref.); Mode of action of mycotoxins [aflatoxins and PR toxin], by Y. Moule (pp. 1733-1736, 33 ref., Fr, en); Mode of action of trichothecenes, by Y. Ueno (pp. 1737-1745, 43 ref.); Mode of action and human health aspects of aflatoxin carcinogenesis, by W. H. Butler & G. E. Neal (pp. 1747-1751, 23 ref.); Short-term tests and mycotoxins, by C. Malaveille & H. Bartsch (pp. 1753-1757, 36 ref.); Review of prevention, elimination, and detoxification of aflatoxins, by L. A. Goldblatt & F. G. Dollear (pp. 1759-1764, 35 ref.); and The mycotoxins and human health hazards, by C. A. Linsell (pp. 1765-1769, 31 ref.). A further 4 papers are abstracted separately and are in the FSTA author index under International Union for Pure & Applied Chemistry [Mycotoxins Symposium].
AL

52

Relationship between fungal growth and aflatoxin production in varieties of maize and groundnut.
Priyadarshini, E.; Tulpule, P. G.
Journal of Agricultural and Food Chemistry 26 (1) 249-252 (1978) [15 ref. En] [Nat. Inst. of Nutr., Indian Council of Med. Res., Hyderabad-500007, India]

Available methods to quantitate fungal growth in infected grains are far from satisfactory. A chemical method [glucosamine detn.] to estimate fungal growth in infected plant tissue was successfully used to estimate accurately the somatic amount of Aspergillus parasiticus on infected grains. Var. of maize and of groundnuts were studied with respect to their capacity to promote fungal growth and aflatoxin production. No direct correlation was observed between fungal growth and aflatoxin production by the fungus among var. of maize and groundnut, suggesting that genotypes support different amounts of fungal growth and also different amounts of aflatoxin production per unit growth of the fungus.   AS

53

Sampling granular foodstuffs for aflatoxin. [Lecture]
Whitaker, T. B.
Pure and Applied Chemistry 49 (11) 1709-1717 (1977) [10 ref. En] [USDA, N. Carolina State Univ., Raleigh, N. Carolina 27607, USA]

Methodology is described for the design and evaluation of testing programmes to estimate aflatoxin concn. in lots of granular foodstuffs. Use of operating characteristic (OC) curves and of the prior distribution of lot concentrations for comparing and evaluating processor and consumer risks related to testing programmes are demonstrated. OC curves, computed from a system of equations that accounts for errors in sampling, subsampling, and analysis were developed for the 1976 peanut aflatoxin testing programme in the USA. Estimates are given of aflatoxin concn. in lots accepted and rejected by the testing programme. [See FSTA (1978) 10 7C222.]   AS

54

Mycotoxin tolerances in foodstuffs. [Lecture]
Krogh, P.
Pure and Applied Chemistry 49 (11) 1719-1721 (1977) [7 ref. En] [Univ. Inst. of Path. Anatomy, DK-2100 Copenhagen 0, Denmark]

The action taken by many countries regarding mycotoxins in food and feed, under legislative provision or Code of practice, is discussed. So far, only aflatoxin has been dealt with specifically in legislation; tolerances for foods vary from 0 (level set by analytical method) through 30 to 50 parts/billion. [See FSTA (1978) 10 7C222.]   AL

55

Metabolism of aflatoxin and other mycotoxins in relation to their toxicity and the accumulation of residues in animal tissues. [Lecture]
Patterson, D. S. P.
Pure and Applied Chemistry 49 (11) 1723-1731 (1977) [33 ref. En] [Cent. Vet. Lab., Weybridge, Surrey KT15 3NB, UK]

Mycotoxin metabolism is discussed in relation to detoxification, toxic residues in animal tissues used as food, and metabolic activation. Aflatoxins, sterigmatocystin, ochratoxin A, trichothecenes and zearalenone are considered. [See FSTA (1978) 10 7C222.]   AL

56

Production of aflatoxins B and G on solid and broth culture media.
Delucca, A. J., II; Mayne, R. Y.; Franz, A. O., Jr.; Ory, R. L.
Journal of Food Protection 40 (12) 828-830 (1977) [13 ref. En] [S. Regional Res. Cent.,

USDA, PO Box 19687, New Orleans, Louisiana 70179, USA]

Mycelial growth and production of aflatoxins by Aspergillus parasiticus NRRL A-16,462, on whole peanuts, undelintered cottonseed and shredded wheat was compared to growth and aflatoxin production on 10% broths of the same substrates. The greatest amount of toxins was produced on shredded wheat as a whole substrate. The least amount was produced in shredded wheat broth medium. Intermediate levels of toxin were produced on cottonseed in both types of media. More aflatoxin was produced on peanut broth than on whole peanuts. Mycelial growth on whole shredded wheat was greater than growth on the other solid media though it had the lowest amount of growth of the 3 broth media. Among whole substrates, growth on fuzzy cottonseed was least but mycelial growth on cottonseed broth was 2nd of the 3 broth media. Growth on whole peanuts was slightly less than that on shredded wheat; on peanut broth, it was the greatest of the 3 broth media. On whole substrates, the ratio of aflatoxins B:G produced was highest on shredded wheat and lowest on peanuts. In broth culture the B:G ratio was largest on the cottonseed and lowest on shredded wheat. AS

57

Basic techniques in studying mycotoxins: isolation of mycotoxins.

Cole, R. J.

Journal of Food Protection 41 (2) 138-140 (1978) [10 ref. En] [Nat. Peanut Res. Lab., USDA, S. Region, PO Box 637, Dawson, Georgia 31742, USA]

The basic techniques used and the potential problems encountered in isolation of mycotoxins from naturally contaminated commodities and fungal cultures are discussed. Specifially presented are the factors to be considered in selecting a bioassay organism, methods of preparing formulations for mycotoxin administration, modes of administration, methods available for purification, and problems encountered during purification. AS

58

Symposium on mycotoxicology food and feed contamination. [Conference proceedings]

United States of America, American Phytopathological Society

Proceedings of the American Phytopathological Society 3, 99-172 (1976) [many ref. En]

The full text of papers presented at the 68th Annual Meeting of the American Phytopathological Society, Kansas City, Missouri, July 13, 1976 is given, and includes papers on: Introduction and historical perspectives in mycotoxicology research, by R. E. Pettit & R. A. Taber (pp. 99-109, 34 ref.); Mycotoxins and the fungi that produce them, by C. J. Mirocha & C. M. Christensen (pp. 110-125, 44 ref.); and Mycotoxicoses in animals and humans, by W. W. Carlton (pp. 140-155, 60 ref.). A further 2 papers are abstracted separately and are in the author index under United States of America, American Phytopathological Society [Mycotoxicology Symposium]. SP

59

[Mycotoxins in foods (review of the literature).] [Review]

Kravchenko, L. V.

Voprosy Pitaniya No. 2, 3-12 (1978) [63 ref. Ru] [Inst. Pitaniya AMN SSSR, Moscow, USSR]

This review includes a 4-pp. table listing the types of mycotoxins found in foods, the chemical structure, producing organism, natural substrate, toxic effect, and the spp. of animal (including man) affected by them. HBr

60

Environmental factors influencing mycotoxin formation in the contamination of foods. [Lecture]

Diener, U. L.

Proceedings of the American Phytopathological Society 3, 126-139 (1976) [37 ref. En] [Dep. of Botany & Microbiol., Auburn Univ. Agric. Exp. Sta., Auburn, Alabama 36830, USA]

Environmental factors influencing mycotoxin formation in foods are discussed. Mycotoxins and mycotoxicoses considered include: ergotism; Stachybotrys toxin; alimentary toxic aleukia; slaframine; sporidesmins; rubratoxin B; sterigmatocystin; yellow rice toxins; nivalenol and fusarenon X; zearalenone (F-2); T-2 toxin; vomitoxin; penicillic acid; patulin; aflatoxin; and ochratoxin A. [See FSTA (1978) 10 8C268.] SP

61

Incidence, distribution, and disposition of products containing aflatoxins. [Lecture]

Stoloff, L.

Proceedings of the American Phytopathological Society 3, 156-172 (1976) [43 ref. En] [Bureau of Foods, Food & Drug Administration, Washington, DC 20204, USA]

The incidence, distribution, and disposition of products containing aflatoxins are discussed. Susceptible commodities include peanuts, corn, sorghum, rye, wheat, rice, barley, oats, soybeans, pecans, walnuts, almonds, filberts and figs. Aflatoxins in peanuts and corn are discussed in detail. [See FSTA (1978) 10 8C268.] SP

62

Unavoidable low level aflatoxin contamination of peanuts.

Wilson, D. M.; Flowers, R. A.

Journal of the American Oil Chemists' Society 55 (2) 111A-112A (1978) [18 ref. En] [Dep. of Plant Path., Univ. of Georgia, Coastal Plain Exp. Sta., Tifton, Georgia 31794, USA]

In order to determine whether there is a detectable background level of aflatoxins in sound mature peanuts at the time they are dug, samples were collected from each of the 4 replications in 1973, 1974, 1975 and 1976, in the USA. Each yr 5 lb samples of sound peanuts from each plot were shelled, hand sorted to remove damaged and immature kernels, ground, and samples analysed for aflatoxin using the AOAC method. Level of Aspergillus flavus infection was: 1973, 0.9% of 8000 seeds; 1974, 1.4% of 3000 seeds; and 1975 and 1976, 0.6% of 2000 seeds. Quality control measures have been instituted in the US to ensure that unavoidable aflatoxins in consumer peanuts and peanut products do not exceed 20 μg/kg. However, it was found that aflatoxin contamination at a low level (trace to 50 μg/kg) can occur before the peanuts are dug. The data indicate that low level contamination is not related to high levels of A. flavus infection or to current production practices. Low level aflatoxin contamination of peanuts may be endemic and current sorting procedures may not be effective in removing unblemished contaminated peanuts. SP

63

Incidence of aflatoxin contamination on a sampling of southeastern pecans. [Lecture]
Wells, J. M.; Payne, J. A.
Proceedings of the Florida State Horticultural Society 89, 256-257 (1976) [3 ref. En] [Southeastern Fruit & Tree Nut Res. Sta., Agric. Res. Service, USDA, Byron, Georgia 31008, USA]

229 5 kg samples of pecans (Carya illinoensis (Wang) K. Koch) of different cultivars were collected from commercial shelling plants and orchards in the southeastern USA during 1974-1975, and analysed for aflatoxins. Approx. half the samples were taken early in the season (Oct.-Nov.), the rest late (Dec.-Jan.). 7 samples contained 1-5% weevil-damaged nuts, and only 1 sample contained >20 parts per 10^9 aflatoxin (the USFDA safety level). This was a late-season sample, containing 3-5% weevil-damaged nuts. [See FSTA (1978) 10 8J1164]. JRR

64

[Moulds and mycotoxin formation in bread and bakery products.] Schimmelpilze und Mycotoxinbildung auf Brot und Backwaren. [Review]
Reiss, J.
Getreide, Mehl und Brot 31 (10) 265-270 (1977) [47 ref. De] [Grahamhaus Stud KG, Dürerstrasse 24, 6550 Bad Kreuznach, Federal Republic of Germany]

Many moulds produce valuable antibiotics, enzymes and plant acids and hormones. However, in 1960 it was found that moulds growing on bread produced mycotoxins which are dangerous to animals and man. Much data on aflatoxins have been collected in the tropics. Aflatoxin has been found by various authors in bread, flour, semolina and other wheat products. It has been found that no connection exists between temp. optimum for mould growth and temp. optimum for toxin formation. Aflatoxin growth in bread is not fully understood. It is found to decrease during mixing and to reappear during baking. Aflatoxins can be separated by silica gel TLC. A quick method for isolating aflatoxins from bread consists of placing pieces of bread on a substrate of tryptone, yeast extract, iron citrate and agar (Aspergillus differential medium) and if aflatoxin is present a yellow colour will appear. In wrapped bread it is found that the lower the O_2 permeability of the wrapping material, the less the mould and aflatoxin growth. High acidity, as in pumpernickel, also inhibits aflatoxin growth. Patulin is another mycotoxin which has been isolated from penicillium and aspergillus. It has also been found in bread and cakes and has a temp. optimum from 10° to 25°C. It has been found that concn. decreases in bread with increasing incubation time. It is thought that -SH groups and a pH of 5 inactivate patulin. Sterigmatocystin and citrinin are 2 other mycotoxins which have been isolated. Physical or chemical treatments which help to inhibit mycotoxin formation in bread include UV irradiation and addition of calcium propionate, sorbic acid, sorbylpropionate, citric acid and lactic acid. JVR

65

Wild rice as fermentation substrate for mycotoxin production.
Lindenfelser, L. A.; Ciegler, A.; Hesseltine, C. W.
Applied and Environmental Microbiology 35 (1) 105-108 (1978) [16 ref. En] [N. Regional Res. Cent., USDA, Peoria, Illinois 61604, USA]

Many cereal grains have been studied for their suitability as substrates for the fermentative production of mycotoxins. However, except for aflatoxin, wild rice has not been investigated. Hence, 5 mould cultures known to produce the mycotoxins ochratoxin-A, penicillic acid, patulin, vomitoxin and zearalenone were grown on wild rice under varying conditions of moisture and temp. to determine whether this grain would serve as a suitable substrate for toxin production. Under appropriate fermentation conditions, good yields of ochratoxin-A and moderate amounts of patulin were obtained, but only small amounts of penicillic acid, vomitoxin, and zearalenone were elaborated. An extract from a sample of naturally moulded wild rice contained 0.8 μg patulin/g rice. The predominating mould was identified as Aspergillus clavatus. Under identical cultural conditions, this isolate and a known patulin-producing strain of A. clavatus yielded approx. equivalent amounts of the mycotoxin. AS

66

[Detection and determination of aflatoxin M_1 in milk and dried milk.]
Pee, W. van; Brabant, J. van; Joostens, J.
Revue de l'Agriculture 30 (2) 403-415 (1977) [18 ref. Fr, en] [Fac. der

Landbouwwetenschappen, Katholieke Univ. Leuven, Kardinaal Mercierlaan 92-3030 Heverlee, Belgium]

Aflatoxin M_1 was determined in raw and pasteurized milk from various regions of Belgium and in bulk dairy samples of sterilized and dried milk by 2-dimensional TLC and UV fluorescence (360 nm). The limit of detection was 0.02 μg/l. for liquid and 0.1 μg/l. for dried milk. Tabulated results showed that of a total of 68 samples examined 42 (61.7%) were positive, with mean aflatoxin concn. of 0.02-0.095 μg/kg and only 1 sample (of sterilized skim-milk) in the 0.20-0.50 μg/kg range. In view of the high toxicity of this toxin, max. tolerances equal to the detection limits are proposed. RM

67

[Quantitative determination of aflatoxins B_1, B_2, G_1 and G_2 in foods.] Quantitative Bestimmung der Aflatoxine B_1, B_2, G_1 und G_2 in Lebensmitteln.
Müller, H.; Siepe, V.
Deutsche Lebensmittel-Rundschau **74** (4) 133-136 (1978) [5 ref. De, en, fr] [Inst. für Forschung & Entwicklung, Maizena Gesellschaft mbH, Heilbronn, Federal Republic of Germany]

A method for detn. of aflatoxins in foods without the use of chloroform (which is suspected of carcinogenicity) is described, based on the screening method of Seitz & Mohr [FSTA (1974) 6 12M1661]. The sample is homogenized, and extracted with methanol. The extract is then mixed with 20% $(NH_4)_2SO_4$ solution, and defatted with Frigen 113 TR-T. Aflatoxins are then extracted from the aqueous/methanolic phase, concentrated, and separated by TLC on kieselgel plates, using diethyl ether/methanol/water (96:4:0.25) or toluene/isoamyl alcohol/methanol (90:15:2) solvent system. Aflatoxin concn. are determined by means of a chromatogram spectrophotometer. Recovery from various foods was 64-115%; reproducibility studies gave coeff. of variation of ±6 to ±22%; these values are within the normal range for other methods of aflatoxin detn. AJDW

68

Mycotoxins in foodstuffs. [Conference proceedings]
International Union of Pure & Applied Chemistry; France, Comite National de la Chimie; France, Comite National des Sciences de la Nutrition
Annales de la Nutrition et de l'Alimentation **31** (4/5/6) 403-1030 (1977) [many ref. En, Fr]

The 3rd International IUPAC Symposium on mycotoxins in foods was held in Paris on 16-18 Sept. 1976. Proceedings dealt with the occurrence and bioproduction of mycotoxins, tolerance, newly discovered mycotoxins, toxicity, mode of action, metabolism and public health aspects. Papers presented include Water soluble toxins of Stachybotrys alternans [isolated from grain mixtures], by M. Nummi & M.-J. Niku-Paavola (pp. 761-769, 6 ref.); Mode of action and human health aspects of aflatoxin carcinogenesis, by W. H. Butler & G. E. Neal (pp. 949-956, many ref.); and The mycotoxins and human health hazards, by C. A. Linsell (pp. 997-1004, many ref.). 38 papers are individually abstracted, and are in the FSTA author index under International Union of Pure & Applied Chemistry [Mycotoxins Symposium]; 2 have been abstracted from pure and Applied Chemistry [see FSTA (1978) 10 7C246 and 7C248]. RM

69

Mycotoxic diseases produced in mice by species of the Aspergillus ochraceus group.
Zimmermann, J. L.; Carlton, W. W.
Food and Cosmetics Toxicology **15** (5) 411-418 (1977) [27 ref. En] [Dep. of Vet. Microbiol. & Path., School of Vet. Med., Purdue Univ., W. Lafayette, Indiana 47907, USA]

A description is given of mycotoxin production and mycotoxicoses produced in mice by isolates of 8 spp. of the Aspergillus ochraceus group (A. sclerotiorum, A. alliaceus, A. auricomus, A. melleus, A. ochraceus, A. ostianus, A. elegans, and A. petrakii). VJG

70

[Behaviour of aflatoxin B_1 in the alimentary tract of dairy cows.] Untersuchungen über den Verbleib von Aflatoxin B_1 im Verdauungstrakt von Kühen.
Engel, G.; Hagemeister, H.
Milchwissenschaft **33** (1) 21-23 (1978) [16 ref. De, en] [Inst. für Mikrobiol., Abteilung für Tierernährung, Bundesanstalt für Milchwirtschaft, Kiel, Federal Republic of Germany]

Each of 3 cows with daily milk yields of 14, 14 and 8 l. resp. received daily for 9 days 3500 μg purified aflatoxin B_1 added to the ration. Excretions of aflatoxin M_1 in milk are graphically presented. Max. excretion was on the 5th-6th days of administration, at approx. 20, 8 and 5 μg daily resp. for the 3 cows. Excretion ceased within 5 days after administration of the last dose. SKK

71

Aflatoxin B_1: simple procedures to reduce levels in tropical foods.
Okonkwo, P. O.; Nwokolo, C.
Nutrition Reports International **17** (3) 387-395 (1978) [13 ref. En] [Dep. of Pharmacology & Therapeutics & Med., Univ. of Nigeria Teaching Hospital, Enugu, Nigeria]

Aflatoxin B_1 levels in tropical food, items such as guinea corn, millet, maize, acha, yams, cassava, beans, dried fish, palm oil and groundnut oil, under normal storage conditions were analysed using a combined TLC/fluorometric technique. Cereals, lipid foods and dried fish were found to be highly contaminated by aflatoxin B_1. Effects of wrapping food in polyethylene, exposure of grains to 10 h of bright sunshine, or treatment with hypochlorite solution on aflatoxin levels in food were studied. A comparison of wrapped and unwrapped food over a storage period of 42 days, showed that aflatoxin content increased in unwrapped more than in wrapped foods during storage, with a max. increase between 7 and 14 days. Aflatoxin content was decreased by 30% in maize and 16% in millet grain by exposure to sunlight. A 1% solution of NaOCl (16.5% NaCl + 1% NaOCl) was found to decontaminate dried fish, several cereals and beans of aflatoxin B_1. SP

72

Food mycotoxins survey and monitoring programs. [Lecture]
Campbell, A. D.
Annales de la Nutrition et de l'Alimentation **31** (4/5/6) 403-410 (1977) [7 ref. En] [FDA, Washington, DC, USA]

With the aid of examples the author discusses effective mycotoxin survey and monitoring programmes. The US aflatoxin monitoring plan for peanut processing includes import, export and manufacturing quality control. Points of testing, sampling, sample preparation and types of test, e.g. screening and multidetection chemical and confirmation tests, are discussed. [See FSTA (1978) **10** 9C297.] RM

73

Mycotoxins in foods and feeds. Their occurrence and significance. [Lecture]
Bainton, J.; Jones, B. D.
Annales de la Nutrition et de l'Alimentation **31** (4/5/6) 415-424 (1977) [many ref. En] [TPI, 56/62 Gray's Inn Road, London WC1, UK]

Results from a world-wide survey on mycotoxin contaminations in foods and feeds are presented in a condensed form. Results are grouped together on geographical and commodity bases and summarized in histograms and a table. Only general indications of the current situation were obtained. [See FSTA (1978) **10** 9C297.] RM

74

Aflatoxin in Tunisian foods and foodstuffs. [Lecture]
Boutrif, E.; Jemmali, M.; Campbell, A. D.; Pohland, A. E.
Annales de la Nutrition et de l'Alimentation **31** (4/5/6) 431-434 (1977) [4 ref. En, fr] [Inst. Nat. de Nutr. & de Tech. Alimentaire, Tunis, Tunisia]

1076 samples of different commodities taken from stores and dealers throughout the country were screened for aflatoxin contamination. Tabulated results showed that 13 samples contamined aflatoxin, with 3 of 38 corn samples containing 48-62 μg B_1/kg, and 8-22 μg G_1/kg, 2 of 6 corn samples 30-35 μg B_1/kg, 1 of 19 pistachio nut samples 22 μg B_1/kg, 1 of 35 pea samples 25 μg B_1 and 42 μg G_1/kg, 2 of 248 cheese samples 1 μg B_1 and 6.2-10.6 μg M_1/kg and 4 of 65 peanut samples 6-46 μg B_1 and 0.38 μg G_1/kg. No positive samples were found in wheat, barley, lentils, almonds, sesame and sunflower seeds, beans and milk (45 samples). [See FSTA (1978) **10** 9C297.] RM

75

Survey of total aflatoxin content in peanuts, peanut butter and other foodstuffs. [Lecture]
Gelda, C. S.; Luyt, L. J.
Annales de la Nutrition et de l'Alimentation **31** (4/5/6) 477-483 (1977) [3 ref. En] [Ind. Lab. of Canada, The Borden Co. Ltd., PO Box 7, 80 Harvey Street, Tillsonburg, Ontario N4G 4H3, Canada]

A study using the 'Best Foods' method was done over 6 yr to determine aflatoxin contents in peanuts, peanut butter and other foods. Tabulated results showed that of 1679 samples of raw peanuts 98 (5.8%) contained >25.0 parts/billion (p.p.b.) total aflatoxins, and 89.8% <15.0 p.p.b.; of 157 samples of processed nuts 2 (1.3%) contained >25 p.p.b., and all the rest <15 p.p.b.; and of 2092 samples of peanut butter 3 (0.14%) contained >25 p.p.b., and 12 (0.57%) contained 15-24.9 p.p.b. Of 120 samples of cashews, 10 (8.3%) contained >15 p.p.b., as well as 1 of 78 samples of almonds, 2 (1.3%) of 156 samples of walnuts, 10 (5.7%) of 175 samples of pistachios, but none of the pecans, filberts and Brazil nuts (55, 33 and 24 samples, resp.). Of 244 samples of other foods, only 1 sample each of sunflower seeds and corn contained >15 p.p.b., and none of the cocoa beans, beans, mushroom and cocoa beans. Test data of foods other than nuts showed aflatoxin levels <5 p.p.b. in 95.9% of samples. [See FSTA (1978) **10** 9C297.] RM

76

The F.A.O. programme and mycotoxins. [Lecture]
Herz, K. O.
Annales de la Nutrition et de l'Alimentation **31** (4/5/6) 545-550 (1977) [En] [Food Standards & Food Sci. Service, Food Policy & Nutr. Div., FAO, Rome, Italy]

The FAO involvement in the field of mycotoxin is reviewed. [See FSTA (1978) **10** 9C297.] RM

77

[Toxigenic power of Aspergillus flavus strains.] [Lecture]
Jacquet, J.; Tantaoui-Elaraki, A.
Annales de la Nutrition et de l'Alimentation **31** (4/5/6) 563-574 (1977) [11 ref. Fr] [Lab. de Microbiol., UER des Sci. de la vie et du Comportement, Univ. de Caen, 14032 Caen Cedex, France]

Following a previous study on 925 A. flavus strains [see FSTA (1976) **8** 7C310], the inheritance of toxigenicity through conidiospores was investigated. Single spore cultures showed the existence of a Gaussian distribution of toxigenicity in conidia from a colony from single spore culture of a toxigenic strain, the appearance of a small number of toxigenic conidia from a non-toxigenic strain and a large decrease in toxigenicity of toxigenic strains in mixed cultures with non-toxigenic strains. This reduction was not due to more vigorous growth of the non-toxigenic strain. Considerable variability in toxin production (aflatoxin B by A. flavus, B and G by A. parasiticus) was observed on serial testing of fractions from the same inoculum, containing the same number of spores incubated under the same conditions. [See FSTA (1978) 10 9C297.] RM

78

[In vitro production of aflatoxin in relation to various culture conditions.] [Lecture]
Masimango, N.; Ramaut, J. L.; Remacle, J.
Annales de la Nutrition et de l'Alimentation **31** (4/5/6) 583-605 (1977) [10 ref. Fr] [Dep. de Bot., Univ. de Liege, Sart Tilman, B-4000 Liege, Belgium]

In view of its importance for food spoilage, in vitro conditions governing aflatoxin B_1 production by 5 toxigenic Aspergillus flavus strains were studied (agitation method, incubation temp., pH, illumination). Toxin was determined in the culture medium and in the mycelium. Tabulated results showed that while aerobic agitation (aeration, shaking, stirring) had no effect, mycelial growth and toxin production were considerably reduced by bubbling N_2 through the medium; greatest mycelial growth and toxin production took place at 25° C and initial pH 4-6. Positive correlation was observed between growth, toxin production and pH. Toxin production was inhibited by continuous darkness except for 1 strain, in which it was inhibited by continuous illumination. In some cases the major part of the aflatoxin remained in the mycelium. [See FSTA (1978) 10 9C297.] RM

79

Toxigenic Aspergilli isolated from different sources in Egypt. [Lecture]
Moubasher, A. H.; El-Kady, I. A.; Shoriet, A.
Annales de la Nutrition et de l'Alimentation **31** (4/5/6) 607-615 (1977) [many ref. En] [Bot. Dep., Assiut Univ., Assiut, Egypt]

45 cultures of Aspergillus belonging to 25 spp. and isolated from different sources in Egypt (including seeds and grain) were tested for toxicity to chicken embryos and Bacillus megaterium. Mycotoxins were detected by TLC. 30 isolates of 45 exhibited toxicity, 3 were high toxin producers: A. egyptiacus, A. carneus and A. terricola. The first 2 produced unknown toxins and A. terricola produced aflatoxins B_1, B_2, G_1 and G_2. Aflatoxins production by A. terricola is reported for the first time. [See FSTA (1978) 10 9C297.] AS

80

Mycotoxins in Aspergillus oryzae strains for use in the food industry as starters and enzyme producing molds. [Lecture]
Orth, R.
Annales de la Nutrition et de l'Alimentation **31** (4/5/6) 617-624 (1977) [many ref. En, fr] [Federal Res. Cent. for Nutr., Engesserstrasse 20, D-7500 Karlsruhe, Federal Republic of Germany]

To prevent the occurrence of toxins in foods, German and International FAO/WHO Expert Committees on Food Additives have recommended the exclusive use of strains producing no toxic or carcinogenic metabolites as starters in food technology. Owing to the importance of Aspergillus oryzae as a starter, and the discovery of a strain producing large amounts (182 mg/l.) of cyclopiazonic acid, 16 strains of A. oryzae were examined in vitro for production of aflatoxin, sterigmatocystin, cyclopiazonic acid and β-nitropropionic acid. None of the strains produced aflatoxin or sterigmatocystin, 8 produced cyclopiazonic acid, and 7 β-nitropropionic acid; 3 produced both mycotoxins, though on different media and under different conditions. Results suggest potential health hazards from such strains used as starters or as enzyme preparations. [From En summ.] [See FSTA (1978) 10 9C297.] RM

81

Biosynthesis of aflatoxins. [Lecture]
Venkitasubramanian, T. A.; Gupta, S. K.
Annales de la Nutrition et de l'Alimentation **31** (4/5/6) 635-642 (1977) [many ref. En] [Dep. of Biochem., Vallabhbhai Patel Chest Inst., Univ. of Delhi, Delhi 11007, India]

The role of Zn in the primary metabolism of Aspergillus parasiticus was studied in relation to aflatoxin synthesis, in view of the reported resistance of natural substrates (soybean, corn) to toxin production due to binding of Zn with phytic acid. Zn deficiency was found to reduce fungal growth and aflatoxin, protein and nucleic acid synthesis, while stimulating lipid formation. [See FSTA (1978) 10 9C297.] RM

82

Hepato- and cardiotoxicity of xanthoascin, a new xanthocillin analogue produced by Aspergillus candidus. II. A preliminary electron microscopic observation of the heart and lung with intracellular myelin-like figures. [Lecture]
Ohtsubo, K.; Saito, M.
Annales de la Nutrition et de l'Alimentation **31** (4/5/6) 771-779 (1977) [7 ref. En] [Inst. of Med. Sci., Univ. of Tokyo, Shirokanedai 4-6-1, Minato-ku, Tokyo 108, Japan]

Electron microscopic investigations on myocardial and pulmonary lesions in mice after administration of xanthoascin (a toxic metabolite isolated from rice grains infested with Aspergillus candidus) suggested that it may be a causative agent of primary myocardial diseases in man. The examination of foods for contamination with A. candidus and xanthoascin is urged. [See FSTA (1978) 10 9C297.] RM

83

Mutagenic effect of aflatoxin B_1. [Lecture]
El-Zawahri, M.; Moubasher, A.; Morad, M.; El-Kady, I.
Annales de la Nutrition et de l'Alimentation 31 (4/5/6) 859-866 (1977) [many ref. En, fr] [Dep. of Genetics, Assiut Univ., Assiut, Egypt]

The mutagenic effect of aflatoxin B_1 (a metabolite found in mouldy foods) on human chromosomes was studied. Experiments showed it to be a strong chromosome damaging agent, with a high rate of aberrations (mainly breaks and interchanges) in treated cells. [See FSTA (1978) 10 9C297.] RM

84

Short-term tests and mycotoxins. [Lecture]
Malaveille, C.; Bartsch, H.
Annales de la Nutrition et de l'Alimentation 31 (4/5/6) 871-879 (1977) [many ref. En, fr] [Int. Agency for Res. on Cancer, 150 Cours Albert-Thomas, 69008 Lyon, France]

Short term tests currently used as screening techniques for potential mutagenic and carcinogenic mycotoxins are briefly discussed, i.e. mutagenesis, DNA repair, chromosomal aberrations, cell transformation, cytological alterations, and in vitro and in vivo reactions with nucleic acids. Based on recent publications and the authors' own investigations, a critical review is made of 2 major aspects of various short term tests; their predictive value in order to assess the possible carcinogenic risk; and their usefulness for investigating the mode of action of these compounds in mammals including man. [See FSTA (1978) 10 9C297.] RM

85

Metabolic activation and detoxification of mycotoxins. [Lecture]
Patterson, D. S. P.
Annales de la Nutrition et de l'Alimentation 31 (4/5/6) 901-910 (1977) [many ref. En] [Cent. Vet. Lab., Weybridge, Surrey, UK]

The metabolism of the aflatoxins, sterigmatocystin, ochratoxins A and B, and the trichothecene series of mycotoxins is briefly considered with emphasis on possible metabolic activation, i.e. in vivo conversion of toxins to an activated form. The main potential threat to human health is due to the appearance of aflatoxin M_1 in milk from animals fed contaminated feed. The aflatoxins, ochratoxin A and probably sterigmatocystin present residue problems when ingested by farm animals. [See FSTA (1978) 10 9C297.] RM

86

Aflatoxin and encephalopathy with fatty degeneration of viscera (Reye). [Lecture]
Dvorackova, I.; Kusak, V.; Vesely, O.; Vesela, J. Nesnidal, P.
Annales de la Nutrition et de l'Alimentation 31 (4/5/6) 977-989 (1977) [10 ref. En] [Dep. of Path., Med. Fac. of Charles Univ., Hradec Kralove, Czechoslovakia]

In the past 5 yr, 27 children aged 3 days to 8 yr who died of encephalopathic syndrome with fatty degeneration of the viscera (Reye) were examined. Bacteriological and virological investigations were negative in all cases, but aflatoxin B_1 was found in the livers. The source of intoxication in 5 cases was aflatoxin-contaminated milk food. Observations of 2 cases of 3-day old newborns suggested the possibility of intra-uterine intoxication. [See FSTA (1978) 10 9C297.] RM

87

The problem of aflatoxic human disease in parts of India -epidemiological and ecological aspects. [Lecture]
Krishnamachari, K. A. V. R.; Ramesh Bhat, V.; Nagarajan, V.; Tilak, T. B. V.; Tulpule, P. G.
Annales de la Nutrition et de l'Alimentation 31 (4/5/6) 991-996 (1977) [13 ref. En] [Nat. Inst. of Nutr., Indian Council of Med. Res., Jamai-Osmania PO, Hyderabad-7, Andhra Pradesh, India]

An outbreak of disease characterized by jaundice, rapidly developing ascites and portal hypertension associated with 20% mortality was investigated in 1974. Analysis of food samples revealed that the outbreak was due to consumption of maize heavily infested with Aspergillus flavus. Aflatoxin levels in food samples ranged from 2.5 to 15.6 µg/g. Between 2 and 6 mg aflatoxin/day seemed to have been consumed by the affected people for many wk. In contrast, 1975 analyses revealed <0.1 µg aflatoxin/g and no major outbreak of the disease. [See FSTA (1978) 10 9C297.] RM

88

Dietary aflatoxins and human primary liver cancer. [Lecture]
Peers, F. G.; Linsell, C. A.
Annales de la Nutrition et de l'Alimentation 31 (4/5/6) 1005-1017 (1977) [many ref. En] [Tropical Products Institute, 56-62 Gray's Inn Road, London WC1 X8LU, UK]

Results of dietary aflatoxin-liver cancer studies in the Murang'a district of Kenya and in Swaziland were subjected to statistical analysis. Combined results of the 2 studies showed a high degree of positive correlation between the calculated aflatoxin ingestion levels (as mg/kg body wt. day) and the adult incidence rates of hepatocellular carcinoma (as cases/10^5 adults yr) at $P < 0.001$, providing strong circumstantial evidence that there is a need for improved harvesting and storage conditions in lesser-developed countries. [See FSTA (1978) 10 9C297.] RM

89

The public health significance of mycotoxins. [Lecture]
Rutledge, A. E.
Annales de la Nutrition et de l'Alimentation **31** (4/5/6) 1019-1030 (1977) [many ref. En] [Microbiol. Lab. Div. Agrimerica Inc., 1829 Stanley Street, Northbrook, Illinois 60062, USA]

A detailed review is presented of the literature on the major mycotoxin-producing fungi, and the symptons of mycotoxicoses in man and experimental animals. Some case histories are reported. The implementation of all available techniques for reducing the contamination of foods by mycotoxins is urged. [See FSTA (1978) **10** 9C297.] RM

90

Genetics of aflatoxin production in Aspergillus flavus: linkage between a gene for a high B_2:B_1 ratio and the histidine locus on linkage group VIII.
Papa, K. E.
Mycologia **69** (6) 1185-1190 (1977) [9 ref. En] [Dep. of Plant Path., Univ. of Georgia, Athens, Georgia 30602, USA]

91

[Sampling, preparation and chemical analysis of meat and meat products as well as eggs and egg products suspected of containing aflatoxin residues.] Probenahme, Aufbereitung und chemisch-analytische Bestimmung bei Fleisch und Fleischerzeugnissen sowie Eiern und Eiprodukten bei Verdacht auf Aflatoxinrückstände. [Review]
Lötsch, R.
Fleischwirtschaft **58** (3) 419-425 (1978) [many ref. De] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

Based on an extensive literature review, the author concludes that aflatoxin residues in meat and egg products are too rare to justify their inclusion in food inspection analysis. However, detn. is advisable in suspect cases. e.g. fermented meat products (e.g. salami, cervellata sausages) may be produced by an undefined fungal flora or subsequently contaminated by toxigenic fungi. Suspected mycotoxicoses in animals can be confirmed by examination of meat, internal organs and eggs. Sampling, sample preparation and aflatoxin detn. methods are described for fermented, cured or fresh meat, eggs, and meat and egg products and summarized in tables of 7 methods, 5 have a sensitivity of 0.1 parts/billion and 1 [Brown et al. 1973, Journal of the Association of Official Analytical chemists 56, 1437-1439] of 0.05 parts/billion. RM

92

[Aflatoxins from Aspergillus in soybean and other legumes.] [Lecture]
Topsy, K.
Annales de la Nutrition et de l'Alimentation **31** (4/5/6) 625-634 (1977) [14 ref. Fr, en] [Bureau Officiel d'Analyse, Min. de la Sante, 10 Rue Labourdonnais, Port Louis, Mauritius]

The following results were obtained on laboratory studies of soybeans, groundnuts, and their mixtures with various legumes (lentils, dried garden peas, Bengal gram (chick peas), green peas, red peas and broad beans. Aspergillus flavus and aflatoxins B_1 and G_1 were found on soybeans and groundnuts, not on the other legumes. Growth of A. flavus and toxin formation was inhibited in mixtures of legumes with soybeans, and promoted in mixtures of groundnuts with soybeans, suggesting that soybeans should be included in the national food monitoring programme. [See FSTA (1978) **10** 9C297.] RM

93

Determination of aflatoxins in peanuts. [Lecture]
Varsavsky, E.; Sommer, S. E.
Annales de la Nutrition et de l'Alimentation **31** (4/5/6) 539-544 (1977) [many ref. En] [Inst. Nacional de Farmacologia y Bromatologia, Caseros 2161, Buenos Aires, Argentina]

503 samples of peanuts (mainly of lower commercial grades) from 2 seasons were analysed for Aspergillus and aflatoxin contamination. Tabulated results showed 7.6 and 18.5% resp. of aflatoxin contaminated samples in the 2 seasons. A relation appeared between % contamination and acidity of the oil, with, from each season, 19 and 47% resp. of samples having $>2\%$ acidity. About 50% of positive samples contained 100-1000 µg aflatoxin B_1/kg, and 30% >1000 µg B_1/kg. Of 6 strains of A. flavus isolated only 2 were toxigenic; 1 was isolated from a positive and 1 from a negative sample. [See FSTA (1978) **10** 9C297.] RM

94

Aflatoxin formation in peanuts by Aspergillus flavus.
Diener, V. L.; Davis, N. D.
Bulletin, Agricultural Experiment Station, Auburn University No. 493, 49pp. (1977) [86 ref. En] [Agric. Exp. Sta., Auburn Univ., Alabama, USA]

Basic research on aflatoxin in peanuts determined the limiting and optimal temp. and RH conditions for aflatoxin production by A. flavus in shelled sound mature, broken mature and immature kernels, and kernels from intact pods. The aflatoxin producing ability of isolates of A. flavus from several countries and commodities, effect of moisture prior to storage on fungal development, relation of over-maturity to invasion by A. flavus in the field, and the effect of varying concn. of atm. gases on the growth and aflatoxin formation of A. flavus on surface-sterilized sound mature kernels are discussed on the basis of own and published results. A high % of A. flavus are toxigenic and able to grow on almost any raw or processed food. Some of the optimal conditions are 25-35°C, 85-90% RH or peanut kernel moisture $>10\%$. Limiting conditions preventing aflatoxin production are $<83\%$ RH

(kernel moisture ≤ 10%) and temp. < 12° or > 41° C. The potential use of 20-60% CO_2 was indicated for control of fungi during storage, though effects on peanut flavour and quality were not evaluated.
RM

95

Isolation of aflatoxin positive Aspergillus flavus strain from rice mill atmosphere.
Ghosh, S. K.; Mehta, P. K; Patel, J. G.; Kashyap, S. K.; Chatterjee, S. K.
Indian Journal of Microbiology 17 (3) 138-140 (1977) [19 ref. En] [Nat. Inst. of Occupational Health, Ahmedabad-380 016, Gujarat, India]

4 strains of Aspergillus flavus were isolated from the air in 1 rice mill, but none of them could produce aflatoxin. Only 1 of 7 strains isolated from another rice mill produced aflatoxin. Thus, the risk to the health of rice mill workers arising from exposure to aflatoxin-producing strains appears to be small. CFTRI

96

[Mycotoxin production on contaminated maize by several fungal species.]
Tsuruta, O.; Sugimoto, T.; Minamisawa, M.
Report of the National Food Research Institute [Shokuryo Kenkyusho Kenkyu Hokoku] No. 32, 21-24 (1977) [16 ref. Ja, en] [Nat. Food Res. Inst., Min. of Agric. & Forestry, Tokyo, Japan]

In order to simulate more closely the natural conditions in fungus-contaminated cereals, Aspergillus flavus (aflatoxin producer) and A. versicolor, (sterigmatocystin producer) were inoculated into maize held at 28° or 18° C, and with water activities of 0.81 or 0.93. Additionally, these spp., with Eurotium chevalieri, A. ochraceus and A. restrictus were inoculated into maize. Contamination by several fungal spp. resulted in remarkably low mycotoxin production, compared with cases where only 1 sp. was present. The effect was more noticeable with aflatoxin than with sterigmatocystin. [From En summ.] JRR

97

Determination of the potential for mycotoxin contamination of pasta products.
Stoloff, L.; Trucksess, M.; Anderson, P. W.; Glabe, E. F.; Aldridge, J. G.
Journal of Food Science 43 (1) 228-230 (1978) [22 ref. En] [Bureau of Foods, FDA, Washington, DC 20204, USA]

Freshly extruded macaroni and noodle doughs, dusted with flour to which spores of the toxigenic moulds Aspergillus flavus, A. clavatus, A. versicolor, Penicillium urticae, P. cyclopium and P. citrinum had been added, were held at temp.-humidity combinations (30°, 35°, 40° C and 85, 90, 95% RH) expected to simulate possible conditions in fully loaded pasta drier shut down by a power failure. A sour odour at 95% RH suggested initial bacterial action. Mould growth was observed on all products under all conditions; the extent of growth after 5 days was directly related to both temp. and RH. Under all conditions. A. flavus was the dominant mould; of the mycotoxins (aflatoxins, sterigmatocystin, patulin, penicillic acid, citrinin) expected from the spp. included in the inoculum, only aflatoxins were detected. At 30° C and 95% RH, mould growth was evident after 24 h and aflatoxins could be detected after 48 h. The level of aflatoxins was low for the extent of mould growth observed, probably due to presence of the mixed culture. Because of the souring and obvious mould growth, none of the pasta could be considered useable even before aflatoxin was detected. When the aflatoxin-contaminated pasta was cooked for 10 min in boiling water, approx. ⅓ of the aflatoxin was found in the water. Based on these studies and the rarity of encountering aflatoxin in wheat, the possibility of finding aflatoxin in commercial pasta products is highly remote. IFT

98

[Studies on mycotoxins in foods. VII. Detection of aflatoxin M_1 in dried milk.]
Saito, K.; Ogawa, H.; Kazama, E.; Kan, K.; Ibe, A.; Naoi, Y.; Kimura, Y.
Annual Report of Tokyo Metropolitan Research Laboratory of Public Health 27 (1) 153-157 (1976) [8 ref. Ja] [Tokyo Metropolitan Res. Lab. of Public Health 24-1, Kyakunincho 3 chome, Shinjuku-ku, Tokyo, 160 Japan]

See FSTA (1977) 9 2J164 for part VI.

99

Transmission of aflatoxins into eggs and egg products. [Lecture]
Lötzsch, R.; Leistner, L.
Annales de la Nutrition et de l'Alimentation 31 (4/5/6) 499-508 (1977) [many ref. En] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

Pending enactment of Federal German legislation on aflatoxin tolerances in food; Japanese quail and white and brown laying hens (HNL type) were fed continuously with rations containing 40-10 000 parts/billion (p.p.b.) aflatoxin B_1 and 30-13 000 p.p.b. G_1 for 30, 56 and 28 days, resp. Measurable amounts of B_1 toxin were detected in quail eggs at a 100 p.p.b. feeding level, in white hens' eggs at 3000 p.p.b. and in brown hens' eggs at 5000 p.p.b.; max. concn. recovered were 2.5, 0.4 and 0.2 p.p.b. resp. in whole eggs, with slightly higher concn. in yolks than in whites. G_1 toxin was detected in hens' eggs at a feeding level of 1550 p.p.b., with max. concn. of 0.2 and 0.05 p.p.b. in white and brown hens' eggs resp. Egg production by all fowls fed continuously at 10 000 p.p.b. aflatoxin B_1 ceased after a few days thus excluding hazardous residues in eggs, but a single high oral dose of 1.86 mg B_1 toxin/kg body wt. produced residues in eggs up to 7 days after treatment, with a max. concn. of 1.24 p.p.b. Regarding tolerances, quail and hens' eggs present no potential public health hazard. [See FSTA (1978) 10 9C297.] RM

100

Incidence of aflatoxin-potential contamination in Spanish sausages. [Lecture]
Guergue, J.; Ramirez, C.
Annales de la Nutrition et de l'Alimentation 31 (4/5/6) 485-488 (1977) [1 ref. En, fr] [Dep. de Microbiol., Fac. de Ciencias, Univ. de Navarra, Pamplona, Spain]

525 strains of mould were isolated from 8 samples of red pepper (Capsicum annuum) and 3 samples of black pepper (Piper nigrum), commonly used for flavouring Spanish sausages, especially chorizo. 100 of the isolates belonged to the Aspergillus flavus group; 69 were from red pepper and 31 from black pepper. 28 strains from red peppers produced aflatoxin B_1, 16 also aflatoxin G_1, and 8 strains from black peppers produced aflatoxin B_1. After experimental contamination by these aflatoxigenic strains of various kinds of Spanish sausages and drying under conditions similar to those used in the sausage industry, aflatoxins were detected only on the skins but not in the meat of the sausages. [See FSTA (1978) 10 9C297.] AS

101

Aflatoxicol: major aflatoxin B_1 metabolite in rat plasma.
Wong, Z. A.; Hsieh, D. P. H.
Science, USA **200** (4339) 325-327 (1978) [30 ref. En] [Dep. of Environmental Toxicology, Coll. of Agric. & Environmental Sci., Univ. of California, Davis, California 95616, USA]

Aflatoxicol, a carcinogenic metabolite of the foodborne carcinogen aflatoxin B_1 previously known only as a bioreduction production in vitro, was identified as the major aflatoxin metabolite in the plasma of Sprague-Dawley rats, a susceptible species, that had been dosed orally or intravenously with aflatoxin B_1 labelled with ^{14}C. Aflatoxicol, however, was not detected in the plasma of similarly dosed mice and monkeys, which are both resistant to aflatoxin B_1-induced carcinogenesis. The formation of aflatoxicol both in vitro and in vivo may be an indicator of species sensitivity to aflatoxin-induced carcinogenesis and may be useful in the prediction of human susceptibility. AS

102

Degradation of aflatoxins in coconut oil and copra meal (poonac).
Samarajeewa, V.; Arseculeratne, S. N.; Bandunatha, C. H. S. R.
Journal of the National Science Council of Sri Lanka 5 (1) 1-12 (1977) [20 ref. En] [Univ. of Sri Lanka, Peradeniya Campus, Sri Lanka]

Coconut oil containing 10-20 p.p.m. aflatoxin B_1 was stored for 4 months at -85° C in darkness, at 25° C in darkness, heated to 70° C and stored at 25° C in darkness, or at 25° C in diffuse sunlight; exposed to sunlight in thin (1.5-4 cm) or thick (30 cm) layers; heated dry at 100° or 300° C; or subjected to steam at 100° C. Powdered samples of poonac were also exposed to direct sunlight in this (0.5 cm) layers. Results showed that aflatoxin levels were significantly reduced by exposure to sunlight at >60 cal/cm^2, and to very low levels after exposure to 100 cal/cm^2. Of the stored oil samples, only the sample exposed to diffuse sunlight showed a drop in toxin to <0.03 p.p.m.; the others did not change. Naturally contaminated commercial oil (0.1 p.p.m. toxin) was decontaminated to <0.03 p.p.m. on exposure to sunlight at 40 cal/cm^2 in thin layers (4 cm) but not in thick layers (30 cm). There was no change in free fatty acids and colour. No significant changes in aflatoxin levels were observed in oil after dry or steam heating at 100° C, or in powdered poonac exposed to sunlight for $\leqslant 3.5$ h. Exposure to sunlight is suggested as a cheap and efficient method for industrial decontamination of coconut oil. RM

103

Degradation of aflatoxin by lactoperoxidase.
Doyle, M. P.; Marth, E. H.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **166** (5) 271-273 (1978) [14 ref. En, de] [Dep. of Food Sci., Univ. of Wisconsin-Madison, Madison, Wisconsin 53706, USA]

3 concn. of lactoperoxidase, 5, 50 and 500 units/ml of reaction mixture, degraded aflatoxin in the presence of 225μM NaCl and 50μM H_2O_2 at 28° C. Increasing the amount of lactoperoxidase from 50 to 500 units/ml reaction mixture resulted in increased rate of degradation of aflatoxin B_1 from 3.6 to 5.1%/24 h. At a given concn. of lactoperoxidase, aflatoxin degradation was independent of initial aflatoxin concn., and aflatoxin G_1 was degraded approx. 1.5 × faster than was aflatoxin B_1. Derivatives that co-chromatographed with aflatoxin B_{2a} and derivatives that were water soluble were the major degradation products of aflatoxin B_1. Similar derivatives, but in greater proportions, were noted as degradation products that resulted from activity of a blendure of mycelia of Aspergillus parasiticus. AS

104

Methylxanthine inhibition of aflatoxin production.
Buchanan, R. L.; Fletcher, A. M.
Journal of Food Science 43 (2) 654-655 (1978) [11 ref. En] [Dep. of Nutr., Drexel Univ., Philadelphia, Pennsylvania 19104, USA]

The effects of caffeine and theophylline on growth and aflatoxin B_1 production by Aspergillus parasiticus NRRL 2999 were studied in AMY medium [glucose + mineral salts + yeast extract] at pH 4.5. Caffeine levels of 0.5, 1.0 and 2.0 mg/ml decreased aflatoxin production by 86, 96 and 100% resp. Theophylline levels of 2.0, 4.0 and 8.0 mg/ml were tested, but only the highest concn. was inhibitory, decreasing aflatoxin production by 54%. Inhibition of growth was noted, but did not completely account for the reduction in aflatoxin production. The data help to explain why aflatoxins are not usually isolated from caffeine-containing commodities, and indicate that aflatoxin synthesis may be regulated by cyclic AMP. IFT

105

Differences in the chemical constituents of Mangifera indica, infected with Aspergillus niger and Fusarium moniliformae.
Ghosal, S.; Biswas, K.; Chattopadhyay, B. K.
Phytochemistry 17 (4) 689-694 (1978) [31 ref. En] [Pharmaceutical Chem. Res. Lab., Dep. of Pharmaceutics, Banaras Hindu Univ., Varanasi-5, India]

The isolation and characterization of the chemical constituents of different parts of Mangifera indica, sound and infected with 2 pathogenic fungi, viz. Aspergillus niger and Fusarium moniliformae, are described. Natural occurrence of 2 polyketideshikmate-derived depsides is reported for the first time. Additionally, a number of xanthones, flavonoids, triterpenes and amino acids, not encountered before in this species, are reported. The co-occurrence of mangiferin, 1,3,6,7-tetra- and 1,3,5,6,7-pentaoxygenated xanthones and the quantitative variation of the latter 2 compounds with the growing of the plant and during the fungal infection are biochemically significant. The protector role of the flavonoids and other C_{15} metabolites to M. indica from the ingress of the fungal hyphae is indicated. The 2 pathogenic fungi secreted a number of mycotoxins in different parts of the host species during its vegetation and flowering periods. During the elaboration of these toxic metabolites, the host-pathogen interaction played an important role. Evidence is presented for A. niger as a mycotoxin producing fungus. AS

106

Aflatoxins producing strains of Aspergillus flavus link isolated from peanuts in Egypt.
El-Khadem, M.; Naguib, M. M.
Egyptian Journal of Phytopathology 7, 81-88 (1975) [26 ref. En] [Plant Path. Sect., Fac. of Agric., Tanta Univ. Cent., Tanta, Egypt]

Aspergillus flavus, A. niger and spp. of Alternaria, Fusarium, Helminthosporium, Mucor, Penicillium, Rhizoctonia, Rhizopus and Sclerotium were isolated from groundnut shells, and A. flavus, A. niger and spp. of Fusarium, Penicillium, Rhizopus and Sclerotium from groundnut. >60% of the A. flavus strains isolated from groundnut produced aflatoxins. About 40% of these strains produced between 5000-20 000 parts/billion aflatoxin B, while only 2% produced. >50 000 parts/billion aflatoxin B. AS

107

Evaluating the inhibitory action of honey on fungal growth, sporulation, and aflatoxin production.
Wellford, T. E. T.; Eadie, T.; Llewellyn, G. C.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 166 (5) 280-283 (1978) [20 ref. En, de] [Dep. of Biol., Virginia Commonwealth Univ., Richmond, Virginia 23284, USA]

Unprocessed honey was inoculated with toxigenic strains of Aspergillus flavus NRRL 5862 or A. parasiticus NRRL 2999. Growth and subsequent sporulation were seen only in media containing $\leq$60% honey. Media having 40% honey showed growth and sporulation after 2 days. Neither sp. of Aspergillus produced aflatoxins, even in 10% honey. These results confirm earlier observations that pure honey inhibited fungal growth and suggest that even diluted honey is capable of inhibiting toxin production or possibly neutralizing it. The general procedures recommended by the AOAC for extraction and TLC were applied successfully in analysing the honey substrate for aflatoxin. AS

108

[Aflatoxin formation during self-heating of cereals.]
Einige Aspekte zur Frage der Aflatoxinbildung im Verlaufe der Selbsterhitzung des Getreides.
Spicher, G.
Zentralblatt für Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, II 133 (2) 135-145 (1978) [6 ref. De, en] [Bundesforschungsanstalt für Getreide & Kartoffelverarbeitung, Postfach 23, D-4930 Detmold 1, Federal Republic of Germany]

Studies were conducted with samples of Jubilar wheat (initial count 1.5×10^5 bacteria and 6×10^2 moulds/g), inoculated with aflatoxin-forming Aspergillus flavus (to give a total mould count of $0.5\text{-}1.5 \times 10^5$/g). The samples were then adjusted to moisture contents of (i) 16, (ii) 18 or (iii) 20%. Some samples were held in vacuum flasks (initial temp. 20° C), to evaluate self-heating; other samples were stored at constant temp. of 20°, 35° or 40° C. Changes in temp., mould count, bacterial count, germination capacity, fatty acid value, and reducing sugar, non-reducing sugar and aflatoxin concn. during storage for $\leq$28 days were determined, and are presented graphically. The results for samples undergoing self-heating showed that (i) stayed at approx. constant temp.; (iii) rose to a max. of 70° C and (ii) rose to a max. of almost 55° C, then both declined to approx. 50° C. Relatively little aflatoxin formation occurred in (i) or (iii), but considerable aflatoxin formation ($\leq$ approx. 125 μg aflatoxin B_1/kg) occurred in (ii). Mould count of (i) remained constant and that of (iii) decreased sharply during storage; that of (ii) increased, then decreased to the initial value. Changes in physicochemical properties tended to resemble changes in mould count. In the trials at constant temp., mould growth was best at $\geq$18%

moisture and 20-30° C. Aflatoxin formation was maximal at 35° C, and 18 or 20% moisture in the grain. Little aflatoxin formation occurred at 20° C, and practically none at 40° C. It is concluded that self-heating is likely to result in temp. reaching levels too high for aflatoxin formation, except possibly near the outer surfaces of the batch. AJDW

109

Fungi, especially Gibberella zeae, and zearalenone occurrence in wheat.
Hesseltine, C. W.; Rogers, R. F.; Shotwell, O.
Mycologia 70 (1) 14-18 (1978) [4 ref. En] [N. Regional Res. Cent., USDA, Peoria, Illinois 61604, USA]

102 samples of wheat (50 kernels/sample) marketed in 1975 were studied for fungal infection and presence of mycotoxins. Of 19 zearalenone-positive samples, 6-60% of surface-sterilized kernels were infected with G. zeae. Concn. of zearalenone ranged from 364 to 11 054 parts/billion (in a sample with 36% infection), but was mostly between 1000 and 3000. G. zeae was not detected in 35 samples. Of 24 samples with >10% infection, 17 contained zearalenone, and 7 were negative. Of 43 samples with <10% G. zeae infection, only 2 were zearalenone positive, with low levels (<1000 parts/billion). Aspergillus flavus was detected in 53 samples with an infection rate of 2-46%, but no aflatoxin was found. Alternaria spp. were found in 100 samples, and Penicillium spp. in 20 samples (2-16% infection). RM

110

Detoxification of aflatoxin-contaminated corn by roasting.
Conway, H. F.; Anderson, R. A.; Bagley, E. B.
Cereal Chemistry 55 (1) 115-117 (1978) [4 ref. En] [N. Regional Res. Cent., USDA, Peoria, Illinois 61604, USA]

Corn contaminated with aflatoxin was roasted at 145-165° C in a single pass through a continuous roaster. This reduced aflatoxin content (determined by a chemical assay) by 40-80%, i.e. from 80-887 parts/billion to 18-452 parts/billion. The FDA guideline is 20 parts total aflatoxin/billion. Corn that was tempered to 20% moisture with NH_3 solution (to give 0.5% NH_3 dry basis), roasted, and then retempered to 20% moisture (0.5% NH_3) had aflatoxin content reduced by >90% (final level 3-14 parts/billion). It is pointed out that reduction in aflatoxin content detected by chemical assay may not parallel reduction in biological activity. DIH

111

High incidence of hepatic tumours in rats fed mouldy rice contaminated with Aspergillus versicolor containing sterigmatocystin.
Ohtsubo, K.; Saito, M.; Kimura, H.
Food and Cosmetics Toxicology 16 (2) 143-149 (1978) [27 ref. En] [Dep. of Carcinogenesis & Cancer Susceptibility, Inst. of Med. Sci., Univ. of Tokyo, Shirokanedai, Minato-ku, Tokyo 108, Japan]

Rats were fed on a diet into which mouldy rice was mixed to provide a dietary level of 5 or 10 p.p.m. sterigmatocystin, the lowest level of this toxin yet investigated and a level that may occur under natural conditions. This study showed that these rice culture diets caused a high frequency of hepatic tumours in rats - 92.3 and 84.6% with 10 and 5 p.p.m. resp. It may be concluded that sterigmatocystin is a more potent carcinogen than was previously thought, having nearly the same degree of carcinogenicity as aflatoxin B_1. Although it has only been detected in obviously damaged rice, a more extensive survey of the presence of sterigmatocystin and related compounds in staple foods, such as rice, is recommended. VJG

112

Union of Swiss Societies of Experimental Biology. Abstracts of the 10th annual meeting. [Conference proceedings]
Switzerland, Union of Swiss Societies of Experimental Biology
Experientia 34 (7) 894-962 (1978) [En]

Abstracts are published of papers presented at the meeting, held at Davos, 19-20 May 1978. The abstr. include M-line in chicken muscle, by C. W. Heizmann, I. E. Hotz & H. M. Eppenberger (p. 911); Low molecular weight calcium-binding proteins from chicken muscle, by E. E. Strehler, H. M. Eppenberger & C. W. Heizmann (p. 919); The metabolism of (^{14}C)-aflatoxin B_1 in pigs [including a study of distribution of ^{14}C in edible tissues], by J. Lüthy, U. Zweifel & C. Schlatter (p. 926); Proteolytic enzymes in wheat ears during maturation, by U. Feller (p. 940); and Proteolytic activity, lactic acid production, N-acetyl-D-glucosamine fermentation and plasmids in Lactobacillus helveticus subsp. jugurti, by M. Smiley, R. Maret & V. Fryder (p. 955). DIH

113

Effect of light on aflatoxins, anthraquinones, and sclerotia in Aspergillus flavus and A. parasiticus.
Bennett, J. W.; Fernholz, F. A.; Lee, L. S.
Mycologia 70 (1) 104-116 (1978) [32 ref. En] [Tulane Univ., New Orleans, Louisiana 70118, USA]

The effects of continuous light and continuous darkness on aflatoxin and anthraquinone formation by wild, variant and mutant strains of A. flavus and A. parasiticus were studied. Results of in vitro experiments showed no light inhibition on production of these secondary metabolites, but continuous white light inhibited the formation of sclerotia in 10 of 13 strains. Since the sclerotia of aflatoxigenic fungi contain a potent neurological agent (tremorgen), dark-grown cultures of these moulds may present a double toxigenic threat. RM

114

[Detection and effects of mycotoxins.]
Untersuchungen zum Nachweis und zur Wirkung von Mykotoxinen. [Review]
Norpoth, K.; Bösenberg, H.
Berichte über Landwirtschaft 55 (4) 835-847 (1977, publ. 1978) [70 ref. De, en, fr] [Inst. für Staublungenforschung & Arbeitsmed., Univ. Münster, Westring 10, 4400 Münster, Federal Republic of Germany]

Methods of mycotoxin analysis, and the toxic effects of mycotoxins are reviewed with particular reference to aflatoxins. Aspects covered include TLC analysis methods; separation of aflatoxins and their derivatives using high-pressure liquid chromatography (sensitivities of 0.05 ng/ml are possible using fluorescence detection); and MS techniques. Bioassay and radioimmunoassay methods are briefly referred to. Toxicity of aflatoxins, and formation of toxic metabolites in animal tissues are also considered. DIH

115

[Presence of aflatoxins in foods of plant origin.]
Vorkommen der Aflatoxine in pflanzlichen Lebensmitteln.
Battaglia, R.
Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 69 (2) 275-280 (1978) [9 ref. De, en, fr] [Kantonales Lab., Zürich, Switzerland]

The frequency and amount of contamination with aflatoxins of peanuts, corn, almonds, (ground) hazelnuts, copra, pistachio nuts, muscat, and pepper are considered, and these parameters, together with figures for annual consumption are used to calculate risk factors, according to equations given. The total risk factor for a food is used to construct an order of priorities for analysis by food inspection laboratories (the order in which the products are listed above). This can be used to show the number of analyses a laboratory should perform on any one product, given the total number of aflatoxin analyses that may be performed in that laboratory/yr. An example is given for a laboratory capable of performing 300 analyses/yr; 142 of these should be on peanuts, and 101 on corn. DIH

116

[Use of cell cultures and hen embryos for evaluating the toxicity of Aspergillus flavus isolated from food products.]
Lozbin, L. I.; Marova, M. S.; Makedon, I. Yu.
Gigiena i Sanitariya No. 4, 79-82 (1978) [6 ref. Ru] [Kievskii Nauchno-issled. Inst. Gigieny Pitaniya, Kiev, USSR]

117

Aflatoxin at several initial concentrations is degraded by different amounts of mycelium of Aspergillus parasiticus.
Doyle, M. P.; Marth, E. H.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 166 (6) 359-362 (1978) [4 ref. En, de] [Dep. of Food Sci., Univ. of Wisconsin-Madison, Madison, Wisconsin 53706, USA]

Increasing amounts of a blendure of 9-day-old mycelia of Aspergillus parasiticus NRRL 2999 added to aflatoxin/salts reaction mixtures resulted in increased rates at which aflatoxin B_1 and G_1 were degraded. Similarly, increasing the amount(s) of aflatoxin B_1 and/or G_1 in the aflatoxin/salts reaction mixture resulted in increased rates of degradation of aflatoxins B_1 and G_1 by mycelia. This mycelial blendure degraded aflatoxin G_1 approx. 1.6 × more rapidly than aflatoxin B_1 when comparable amounts of the aflatoxins were initially present. When the same mycelial blendure was used to compare combined effects of size of inoculum and initial aflatoxin concn. on aflatoxin degradation, it appeared that increasing the amount of either inoculum or aflatoxin resulted in a comparable increase in degradation of aflatoxin B_1 and G_1. Hence, doubling the amount of inoculum or of aflatoxin resulted in approx. doubled rates at which aflatoxins B_1 and G_1 were degraded. AS

118

[32nd Meeting of the German Association for Nutritional Physiology of Domestic Animals. Göttingen, 20-22 March 1978.] 32. Tagung in Göttingen vom 20. bis 22. März 1978. 25 Jahre Gesellschaft für Ernährungsphysiologie der Haustiere. [Conference proceedings]
Germany, Federal Republic of, Gesellschaft für Ernährungsphysiologie der Haustiere
Zeitschrift für Tierphysiologie, Tierernährung und Futtermittelkunde 40 (3) 109-134 (1978) [De]

Abstracts are given of papers presented at this symposium, including the following which give data of interest to food scientists: Quantitative determination of aflatoxins B_1, B_2, G_1 and G_2 in food and feeds by high-pressure liquid chromatography, by H. Schweighardt, J. Böhm, J. Leibetseder (p. 115); Effects of graded lysine supplements on the performance and carcass quality of swine, by O. P. Walz & H. Brune (pp. 121-122); Effects of energy supply on protein deposition by fattening swine, by A. Hüttmann & H. Henkel (pp. 123-124); Effect of ripeness on thermal damage to protein during drying of maize, by I. Deubelius, M. Thormählen, W. Huss & W. Mühlbauer (pp. 126-127); Stability as a quality criterion of feed and carcass fats, by W. Hartfiel (p. 127); Fattening performance and body composition of German Black Pied and German Simmental bulls, in dependence on energy intake and live weight, by R. Daenicke, K. Rohr, E. Schulz & H. J. Oslage (pp. 128-129); and Effects of P and Na contents in hen feed on laying performance and egg shell stability, by H. Vogt (p. 131). AJDW

119

Aflatoxin producing potential of fungi isolated from postharvest peaches.
Wu, M. T.; Salunkhe, D. K.
Lebensmittel-Wissenschaft und -Technologie 11

(2) 85-87 (1978) [14 ref. En] [Dep. Nutr. & Food Sci., Utah State Univ., Logan, Utah 84322, USA]

4 strains of Aspergillus flavus were isolated from 118 overripe peach fruit samples collected from orchards. Among these only 1 strain was from mouldy flesh and 3 strains were from self-broken kernels of the fruits. Screening for aflatoxin production showed that 1 strain was a nonproducer and 3 strains were producers. These producers produced aflatoxin on yeast extract sucrose medium, autoclaved peach fruits and surface sterilized intact and cut soft ripe fruits and surface sterilized cut hard mature fruits. Intact hard mature fruits were quite resistant to fungal invasion. There was no evidence that any fruit sample collected in this study contained any detectable amount of aflatoxins. AS

120

The incidence of aflatoxin found in groundnuts (Arachis hypogea L.) purchased from markets in and around Accra, Ghana.
Mintah, S.; Hunter, R. B.
Peanut Science 5 (1) 13-16 (1978) [25 ref. En] [Dep. of Crop Sci., Univ. of Ghana, PO Box 68, Legon, Ghana]

80 samples of groundnuts were purchased from local markets in the Accra area to represent Northern and Volta type groundnuts. Sample size was 0.5 kg. Groundnuts were analysed for aflatoxin content. Mean levels found for each type (with ranges in parentheses) were Northern 27 μg/kg (3-133) and Volta 62 μg/kg (10-216). 65% of Volta type and 30% of the Northern type samples had levels >30 μg/kg (max. recommended level of FAO/WHO). Samples from 2 markets were segregated into damaged kernels and undamaged kernels. Mean levels of aflatoxins found (with Volta and Northern types) were in damaged kernels 71-80 μg/kg and in undamaged kernels 8-9 μg/kg. No undamaged kernels contained ≥30 μg/kg. Physical removal of damaged kernels in markets and in the home should be encouraged. DIH

121

Aflatoxin formation on sixteen soybean varieties.
Shotwell, O. L.; Vandegraft, E. E.; Hesseltine, C. W.
Journal of the Association of Official Analytical Chemists 61 (3) 574-577 (1978) [15 ref. En] [USDA, N. Regional Res. Cent., Peoria, Illinois 61604, USA]

16 commercial var. of soybeans were each inoculated separately with 5 isolates of fungi from the Aspergillus flavus series to determine varietal differences in supporting aflatoxin production. The isolates were 2 strains of A. parasiticus (NRRL 2999 and NRRL 3145), 2 strains of A. flavus (NRRL 3357 and NRRL 3353), and 1 strain from a new variant of A. flavus (NRRL 3251). Levels of aflatoxin formed were dependent both on the isolate and on the var. of soybeans. Amsoy-71, Calland, Harosoy, and Pamona var. were the poorest substrates for aflatoxin production in the laboratory fermentation, so they may be resistant to mould invasion and/or toxin formation. AS

122

[Problems of determination of aflatoxins in peanuts - suggestion for a sampling and analysis plan for inspection of imports.] Probleme der Bestimmung von Aflatoxin in Erdnüssen - Vorschlag für einen Probenahme- und Analysenplan für die Importkontrolle.
Knutti, R.; Schlatter, C.
Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 69 (2) 264-274 (1978) [4 ref. De, en, fr] [Inst. für Toxikologie der ETH, Schwerzenbach, Switzerland]

Analysis of whole peanuts for aflatoxin yields widely varying concn. for different samples, owing to the small proportion of kernels contaminated with aflatoxin. Some knowledge of the distribution of aflatoxin between single kernels is needed for deciding whether a sample represents a lot with mean concn. above or below a certain tolerance level. This distribution may be subdivided into a degree of contamination and the probability distribution of aflatoxin between contaminated kernels. In order to to be able to detect a low degree of contamination of 1:10 000 with a certainty of 95% a total sample size of at least 30 000 kernels has to be taken. As the distribution of sample means with increasing sample size approaches a normal distribution, the choice of the underlying model should not be too critical. The negative binomial distribution is selected, because for this model a more reliable point estimate of the degree of contamination can be derived than with an exponential type of distribution. The proposed sampling plan is based on a limit for rejection of 1 part/billion with a producer risk α of 1% and a consumer risk β of 1% for accepting a lot with 5 parts/billion. 3 samples of 10 000 kernels are analysed in the 1st step. If no decision can be reached, another sample of 10 000 kernels has to be taken. Other values for the rejection limit as well as for the implied risks might be chosen without changing the principle of the proposed sampling plan. AS

123

[Traces of aflatoxin B_1 in retail corn products.] Spuren von Aflatoxin B_1 in Maisprodukten des Detailhandels.
Lüthy, J.; Zweifel, U.; Balsiger, C.; Schlatter, C.
Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 69 (2) 281-284 (1978) [11 ref. De, en, fr] [Inst. für Toxikologie der ETH, Schwerzenbach, Switzerland]

50 samples of retail corn products were examined for aflatoxin B_1 content by a TLC method. Confirmation of aflatoxin in positive samples was performed by TLC in different solvent systems, derivatization, spraying of spots with

H_2SO_4, co-chromatography with [^{14}C]aflatoxin B_1, and high pressure liquid chromatography. 12 of 23 samples of corn grits contained aflatoxin B_1 (8 samples at 0.5-1.0 parts/billion, 4 samples at 1.0-3.0 parts/billion) as did 2 of 12 Polenta samples (1.0-3.0 parts/billion) and 1 sample of 'other products' (including extruded corn products and corn starch; in the range 1.0-3.0 parts/billion). Some samples showed traces of aflatoxins B_2 and G_1. Replicate samples from the same package showed good agreement, but it is recommended that homogeneity of aflatoxin content of corn products be more thoroughly studied. DIH

124

Rapid thin layer chromatographic method for determining aflatoxin B_1, ochratoxin A, and zearalenone in corn.

Balzer, I.; Bogdanic, C.; Pepeljnjak, S.

Journal of the Association of Official Analytical Chemists 61 (3) 584-585 (1978) [9 ref. En] [Fac. of Agric., Univ. of Zagreb, Zagreb, Yugoslavia]

A multimycotoxin TLC method is described for the analysis of corn. Aflatoxins are extracted from the samples with acetonitrile-water, and sodium bicarbonate is added to separate the acidic ochratoxin from zearalenone and aflatoxin B_1. After chloroform extraction, 1N NaOH is added to separate zearalenone and aflatoxin B_1. The separated mycotoxins are spotted on TLC plates, which are then examined under UV light. The following recoveries (%) were obtained for corn samples: aflatoxin B_1 71, ochratoxin A 87, and zearalenone 85. The limits of detection for the respective mycotoxins were 2, 40 and 200 ng/g. AS

125

Photo-destruction of aflatoxin in groundnut oil.

Shantha, T.; Sreenivasa Murthy, V.

Indian Journal of Technology 15 (10) 453-454 (1977) [6 ref. En] [Cent. Food Tech. Res. Inst., Mysore-570 013, Karnataka, India]

Unrefined groundnut oil containing aflatoxin (> 100 μg/kg) was exposed to (i) bright sunlight, (ii) gas-filled tungsten lamp, or (iii) long wave UV light. (i) destroyed 99% of the toxin present in 15 min, whereas (ii) and (iii) destroyed 82-85% of toxin in 18 h and 30-40% of toxin in 2 h exposure. The photolysed oil was not toxic to albino rats, and its absorption peak was shifted from 700 nm to 280 nm after exposure to sunlight. CFTRI

126

Possibilities of interference in the identification of aflatoxin M_1.

Kiermeier, F.; Miller, M.; Weiss, G.; Behringer, G.

Zeitschrift für Lebensmittel-Untersuchung und -Forschung 166 (5) 274-279 (1978) [8 ref. En, de] [Lehrstuhl für Milchwissenschaft & Chem., Tech. Univ., München, D-8050 Freising-Weihenstephan, Federal Republic of Germany]

A 3-yr-old, naturally contaminated dried milk and a 3-yr-old Tilsit cheese, stored at -18° C and produced from naturally contaminated milk, were analysed for aflatoxin M_1 by usual methods. TLC indicated aflatoxin contents as high as 15 μg/kg in dried milk as well as in cheese. Chromatograms were developed in 5 different solvents. In addition, the trifluoroacetate derivatives were produced and separated in 2 different solvents. In all cases the sample spots showed the same R_f-values as the standards. Therefore, the presence of aflatoxin M_1 was considered to be confirmed. From the MS and UV spectra, however, it was concluded that the apparently homogeneous fractions contained $\geqslant 2$ compounds. Aflatoxin M_1 was found only in cheese extracts, whereas dried milk definitely did not contain aflatoxin M_1 in spite of positive TLC results. The toxicity of the aflatoxin M_1 fraction in dried milk was determined by the 'Brine-Shrimp-Test'. Results indicated that the toxicity of the unknown substance was comparable with that of aflatoxin M_1. Since aflatoxin solutions remain stable only for a limited period, the standard solutions used were also tested by MS and UV spectroscopy, and were shown to be mostly decomposed. Freshly produced standard solutions, however, gave identical R_f-values on TLC. Therefore, decomposition of standard solutions cannot be detected by TLC. A definite identification of aflatoxin M_1 in milk and milk products is therefore only possible by additional MS and UV spectrometry. AS

127

Studies on the presence of aflatoxin M_1 in Austrian dried milk.

Sahliger, S.

XX International Dairy Congress E, 734 (1978) [1 ref. En] [Univ. of Vet. Med., Vienna, Austria]

Aflatoxin M_1 levels in 90 samples of dried whole milk, 44 of dried skim-milk, 8 of infant feed powder and 7 of dried cream, taken at 14-day intervals at 3 Austrian dairy factories, were below the detection limit of 0.2 μg/kg. This is attributed to strict control of imported feedstuffs. [See FSTA (1978) 10 10P1408.] EJM

128

[Aflatoxins B_1 and M_1 in Camembert cheese.]

Corbion, B.; Fremy, J. M.

Lait 58 (573/574) 133-140 (1978) [7 ref. Fr, en] [Lab. Central d'Hygiene Alimentaire, 75015 Paris, France]

100 samples of Camembert cheese from 40 cheese factories in the northern part of France were examined for aflatoxins by the methods of Shih & Marth, [FSTA (1971) 3 10C191.], Kiermeier [FSTA (1974) 6 6P803; (1976) 8 10P1958] and Stubblefield [FSTA (1974) 6 12P1848, 1849]. Aflatoxin B_1 was not detected in any of the cheeses, and aflatoxin M_1 was only present in trace amounts in 1 cheese. The 3 methods gave similar

recoveries for aflatoxins added to the cheese samples. Problems associated with the detection of aflatoxin M_1 are discussed briefly. MEG

129

Study of the occurrence of aflatoxins B_1 and A_1 in Camembert type cheeses.
Corbion, B.; Fremy, J. M.
XX International Dairy Congress E, 347 (1978) [En] [Min. de l'Agric., Lab. Cent. d'Hygiene Alimentaire, Paris, France]

100 samples of Camembert-type cheese, taken from 40 factories in Northern France during winter 1976; none contained aflatoxin B_1 and only 1 contained traces of aflatoxin M_1; detection limits were 1.5 and 2.5 µg/kg, resp. In 30% of samples, initial analysis had indicated the possible occurrence of M_1 but further tests (use of standards and reaction with trifluoroacetic acid) did not confirm this. [See FSTA (1978) 10 10P1408.] DMK

130

The relationship between pause and egg laying characters.
Kamar, G. A. R.; Kheireldin, M. A.; Darwish, A.; Ali, M. M.
Egyptian Journal of Animal Production 15 (1) 95-101 (1975) [10 ref. En, ar] [Anim. Production Dep., Fac. of Agric., Cairo Univ., Giza, Egypt]

16 Fayoumi (F) and 13 White Plymouth Rock (WPR) pullets were used in a study on effects of 'pause' duration (temporary cessation of laying) on egg quality. Tables of data are given for egg wt., albumen, yolk and shell wt. and %, shell thickness, Haugh score, yolk index and yolk colour of the first egg laid after the pause. Egg wt. of F decreased with increasing pause length $\leqslant 5$ days, then increased; egg wt. of WPR decreased with increasing pause length over the whole range ($\leqslant 6$ days) studied. Albumen % decreased with increasing pause length $\leqslant 5$ days for F and $\leqslant 4$ days for WPR, then increased with further increase in pause length. Yolk % followed an approx. opposite trend in relation to pause length. Shell % of F increased with increasing pause length; no regular trend could be observed for shell % of WPR. Yolk index of eggs of both breeds tended to decrease with increasing pause length $\leqslant 3$ days, then increased. Yolk colour tended to increase for F eggs and to decrease for WPR eggs $\leqslant 3$ days pause, then remained approx. constant. Haugh score increased with increasing pause length in both breeds. Shell thickness of both F and WPR decreased with increasing pause length $\leqslant 4$ days, then remained constant. AJDW

131

[Introduction to mycotoxin problems.] Einführung in die Mykotoxin-Problematik. [Review]
Kiermeier, F.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 167 (2) 115-127 (1978) [106 ref. De, en] [Chem.-Physikalisches Inst., Süddeutsche Versuchs- & Forschungsanstalt für Milchwirtschaft, D-8050 Freising-Weihenstephan, Federal Republic of Germany]

Aspects covered in this review include: definition of mycotoxins; toxicity; foods in which mycotoxins occur; mycotoxins and toxigenic fungi in foods; factors influencing mycotoxin formation; and problems with sampling of foods for detn. of mycotoxins with reference to uneven distribution of mycotoxins, instability of mycotoxins, sample size, sample subdivision, and sampling of packaged foods. AJDW

132

Mycotoxins in food. Proceedings of the 2nd International Symposium IUPAC and PAN 23-25 July, 1974, Pulawy, Poland. [Conference proceedings]
International Union of Pure & Applied Chemistry; **Poland**, Polish Academy of Sciences
Zeszyty Problemowe Postepow Nauk Rolniczych No. 189, 1-293 (1977) [many ref. En, pl, ru]

Papers presented at the symposium include Mycotoxins in foods, by A. D. Campbell (abstr. only, p. 19, En, pl, ru); Experimental porcine nephropathy induced by ochratoxin A contaminated feed. Changes of renal function and structure, by P. Krogh, N. H. Axelsen, F. Elling, N. Gyrd-Hansen, B. Hald, J. Hyldgaard-Jensen, A. E. Larsen, A. Madsen, H. P. Mortensen, T. Moller, O. K. Petersen, U. Ravnskov, M. Rostgaard & O. Aalund (abstr. only, pp. 201-202, En, pl, ru); and Detection method for sterigmatocystin, ochratoxins and aflatoxin B_1 (work in progress), by K. Lemieszek (pp. 267-268, 1 ref., En, pl, ru). A further 27 papers are abstracted separately and are in FSTA in the author index under International Union of Pure & Applied Chemistry [2nd Mycotoxins Symposium]. DIH

133

Use of high performance liquid chromatography combined with fluorescence detection for the identification and estimation of aflatoxins and ochratoxin in food.
Hunt, D. C.; Bourdon, A. T.; Wild, P. J.; Crosby, N. T.
Journal of the Science of Food and Agriculture 29 (3) 234-238 (1978) [8 ref. En] [Dep. of Ind., Lab. of the Gov. Chem., Cornwall House, Stamford Street, London SE1 9NQ, UK]

A method was developed for the separation, identification and estimation of 6 mycotoxins in foods at the µg/kg level. The food is extracted by using aqueous acetonitrile and the extract is then washed with 2,2,4-trimethylpentane and any mycotoxins re-extracted into chloroform. The extract is then purified using grooved TLC plates coated with silica gel. After chromatography, any fluorescent bands are removed and examined by high performance liquid chromatography using a fluorescence detector. The method was tested using a range of foods [baked beans, nuts, breakfast cereal], including total diet samples. Recoveries at twice the detection limit [μg/kg) aflatoxins B_1, B_2, 2.5; aflatoxins G_1, G_2, M_1, 0.3-0.6; and ochratoxin A, 12.5] varied from 40 to 95%. AS

134

A survey of some foods for aflatoxins.
Stanton, D. W.
Food Technology in New Zealand 12 (4) 25 (1977) [8 ref. En] [Chem. Div., Dep. of Sci. & Ind. Res., Auckland, New Zealand]

Peanut kernels, barley, rice, peanut butter, soybeans, soybean oil, sunflower seed oil, wheat flour, soy flour, wholemeal flour, pearl barley and whole millet samples were analysed for the presence of aflatoxins by TLC of chloroform extracts. The only toxins detected were in 2 peanut samples, at 5 and 6 μg/kg aflatoxin B_1. This is well below the WHO max. level of 30 μg/kg. JRR

135

Use of high performance liquid chromatography [HPLC] for the identification and estimation of zearalenone, patulin and penicillic acid in food.
Hunt, D. C.; Bourdon, A. T.; Crosby, N. T.
Journal of the Science of Food and Agriculture 29 (3) 239-244 (1978) [10 ref. En] [Dep. of Ind., Lab. of the Gov. Chem., Cornwall House, Stamford Street, London SE1 9NQ, UK]

A method is described for the estimation of 3 UV-absorbent mycotoxins in foods by using semi-preparative and analytical HPLC columns. The foodstuff is extracted using aqueous acetonitrile, and fatty matter is removed from the extract by partition into 2,2,4-trimethylpentane. Mycotoxins present in the fat-free extract are then back extracted into chloroform and separated into 2 fractions on a silica gel column using diethyl ether and then chloroform/methanol. Further purification on a semi-preparative alumina column is described prior to measurement of mycotoxin content on analytical HPLC columns. Recoveries of zearalenone, patulin and penicillic acid added at 2-4 × the detection limit to samples of meat, dairy products and cereals ranged from 50 to 100%. An interfering peak prevented measurement of low levels of zearalenone in baked beans and dairy products. AS

136

Possible production of aflatoxin B_1 in mayonnaise and Cottage cheese. [Lecture]
Burzynska, H.
Zeszyty Problemowe Postepow Nauk Rolniczych No. 189, 83-87 (1977) [13 ref. En, pl, ru] [Nat. Inst. of Hygiene, 00-791 Warsaw, Poland]

Conidia of Aspergillus flavus were inoculated into samples of mayonnaise, which were incubated at 10°, 20°, 25° or 30° C, and of Cottage cheese, which were incubated at 25° C. Aflatoxin B_1 production was quantitated by a TLC fluorescence intensity method. In mayonnaise, aflatoxin production was not detectable at 10° C after 2 wk-1 month, but was detectable after 10 days at 20° C. Peak amounts of aflatoxin B_1 found at 25° C and 30° C were 17.6 and 24.0 μg/g at 14 and 7 days, resp. In Cottage cheese, 0.4 μg aflatoxin B_1/g was found after 12 days. Amount of aflatoxin production was relatively insensitive to number of conidia inoculated for both products studied. [See FSTA (1978) **10** 12C454.] DIH

137

The occurrence of aflatoxin B_1 in peanuts, corn and dried cassava sold at the local market in Kinshasa, Zaire; its coincidence with high hepatoma morbidity among the population. [Lecture]
Brudzynski, A.; Pee, W. van; Kornaszewski, W.
Zeszyty Problemowe Postepow Nauk Rolniczych No. 189, 113-115 (1977) [3 ref. En, pl, ru] [Dep. des Ind. Agric., Univ. Nat. du Zaire, Campus de Kinshasa, Republic du Zaire]

Aflatoxin B_1 content of samples was determined by a TLC method. 1 of 12 corn samples was contaminated (> 200 parts/billion); and 33% of dried cassava samples were contaminated. Number of samples of peanuts contaminated and levels of aflatoxin B_1 are tabulated for select and inferior quality. 80% and 38.9% of select and inferior quality samples, resp. were not contaminated; 33% of inferior quality samples contained > 250 parts/billion aflatoxin B_1. Results are related to local incidence of hepatoma and humidity of climate. [See FSTA (1978) **10** 12C454.] DIH

138

The mycoflora of some Egyptian seeds and their potentialities for production of aflatoxins. [Lecture]
Moubasher, A. H.; El-Kady, I. A.; Farghally, S. M.
Zeszyty Problemowe Postepow Nauk Rolniczych No. 189, 141-147 (1977) [16 ref. En, pl, ru] [Botany Dep., Fac. of Sci., Assiut Univ., Assiut, Egypt]

The mycoflora of Egyptian peanuts, lupin seeds and fenugreek was examined, and isolates of Aspergillus flavus obtained were examined for aflatoxin production. 30 spp. representing 21 genera were found, including 10 Aspergillus spp. A. flavus and Fusarium oxysporum contaminated all seeds studied. 10 strains of A. flavus were cultured on a liquid medium; 1 produced no aflatoxins, 1 produced only aflatoxins G_1 and G_2, 1 produced only aflatoxins B_1 and B_2, and the rest produced all 4. Agitated submerged culture gave increased production of aflatoxins G_1 and G_2 for all strains capable of producing them in surface culture; a strain that in surface culture produced only aflatoxins B_1 and B_2 increased production of these in agitated submerged culture. Different culture methods did not cause the non-toxigenic strain to become toxigenic. [See FSTA (1978) **10** 12C454.] DIH

139

Organization and results of mycotoxin control in the GDR. [Lecture]
Thurm, V.
Zeszyty Problemowe Postepow Nauk Rolniczych
No. 189, 149-154 (1977) [33 ref. En, pl, ru]
[Chem. Dep., Hygiene Inst. Wernigerode, Burgstrasse 37, DDR 37 Wernigerode, German Democratic Republic]

The examination of foods for mycotoxins in the German Democratic Republic is discussed, with particular reference to aflatoxins in peanuts, and resulting aflatoxins M_1 and M_2 in milk from cows fed contaminated peanut meal. Sampling procedures for imported peanuts are described and the official methods for screening for aflatoxin content and quantitative detn. of aflatoxins in peanuts are summarized. Contaminated peanuts are used for producing peanut oil. 23% of peanut samples analysed have contained aflatoxins (mainly B_1 and G_1). It is recommended that sampling be extended to cover other foods and other mycotoxins, and that animal feed should be sampled as a preventive measure against contamination of milk and meat. [See FSTA (1978) 10 12C454.] DIH

140

The chemistry of some mycotoxins. [Lecture]
Steyn, P. S.; Vleggaar, R.; Seegers, J. C.
Zeszyty Problemowe Postepow Nauk Rolniczych
No. 189, 163-168 (1977) [14 ref. En, pl, ru]
[Nat. Chem. Res. Lab., PO Box 395, Pretoria 0001, South Africa]

Structural aspects of an aflatoxin B_1 metabolite, 5-hydroxy-aflatoxin B_1, and austocystins A, B, C and D are discussed. Austocystins are more toxic than sterigmatocystin, and possible structure-function relationships are discussed. The toxicity of several synthesized ochratoxin A analogues was assessed in a kidney epithelial cell culture system; none of these ochratoxin A analogues was found to be produced by Aspergillus ochraceus grown on rice. [See FSTA (1978) 10 12C454.] DIH

141

Biological and biochemical characteristics of toxic strains of Aspergillus flavus isolated from imported foodstuffs. [Lecture]
Burzynska, H.
Zeszyty Problemowe Postepow Nauk Rolniczych
No. 189, 215-218 (1977) [17 ref. En, pl, ru]
[State Inst. of Hygiene, Warsaw, Poland]

20 strains of Aspergillus flavus isolated from foods imported into Poland (peanuts, cocoa and walnuts) were studied. (i) non-sclerotia-forming strains produced only aflatoxins B_1 and B_2 (or B_1 alone) on Czapek 2% yeast extract 20% sucrose medium; (ii) sclerotia-forming strains produced aflatoxins B_1, B_2, G_1 and G_2. (i) strains produced greater amounts of aflatoxins, kojic acid and proteolytic and amylolytic enzymes than (ii) strains, and (i) culture filtrates showed higher bacteriostatic activity than (ii) culture filtrates. All strains which produced aflatoxins produced kojic acid. [See FSTA (1978) 10 12C454.] DIH

142

Extraction of 'bound' aflatoxins. [Lecture]
McKinney, J. D.; Cavanagh, G. C.
Zeszyty Problemowe Postepow Nauk Rolniczych
No. 189, 247-254 (1977) [8 ref. En, pl, ru]
[Ranchers Cotton Oil, Fresno, California, USA]

After storage of samples of contaminated raw milk at -10° C for 25 months, the initial aflatoxin level of 5.3 μg/l. had decreased by $<$80% according to assays with conventional AOAC extraction solvent systems [see FSTA (1971) 3 7A293]. If these samples were assayed by a modification of the method of Pons et al. [see FSTA (1974) 6 4P449] using an acetone/water/acetic acid (75:15:10) solvent system, the initial aflatoxin levels could still be detected. Considerably greater quantities of aflatoxin M_1 could be extracted from stored curd and whey fractions (produced by rennet precipitation of contaminated milk) by the experimental solvent system than by the conventional AOAC solvent system. Aflatoxin M_1 levels in freeze-dried milk were not affected by bonding after storage for 12 months at -2° to 0° C, and so could reliably be assayed after either method of solvent extraction. Problems of incomplete extraction by conventional solvents were also encountered with stored finely ground cottonseed kernels. [See FSTA (1978) 10 12C454.] JDr

143

Confirmation reactions on aflatoxin B_1 and G_1. [Lecture]
Verhülsdonk, C. A. H.; Schuller, P. L.; Paulsch, W. E.
Zeszyty Problemowe Postepow Nauk Rolniczych
No. 189, 277-283 (1977) [9 ref. En, pl, ru] [Nat. Inst. of Public Health., Lab. of Chem. Analysis of Foodstuffs, PB 1, Bilthoven, Netherlands]

2 confirmation techniques for the presence of aflatoxin B_1 or G_1 in foods at the level of 2-5 μg/kg are described. The basis of the methods is TLC of derivatives. In the 1st method, supposed aflatoxins are separated from other compounds by TLC, then scraped off the plate, and the epimeric acetates and hemiacetals are formed. These are examined on a 2nd thin layer plate and compared with standards. The 2nd method involves 2-dimensional TLC (chloroform/acetone, 9:1 v/v). After the 1st dimension is developed, an area is sprayed with HCl to form the hemiacetals directly on the plate. After drying in N_2 the 2nd dimension is developed in the same solvent as the 1st. Aflatoxin standards are included on the plate as well as the test sample. This 2nd method gave good results in a collaborative trial. [See FSTA (1978) 10 12C454.] DIH

144

Problems concerning mycotoxin determination. [Lecture]
Fritz, W.; Engst, R.; Krug, G.
Zeszyty Problemowe Postepow Nauk Rolniczych No. 189, 285-290 (1977) [5 ref. En, pl, ru] [Cent. Inst. for Nutr. of Acad. of Sci. ofGDR, 1505 Potsdam-Rehbrücke, German Democratic Republic]

Methods used in the German Democratic Republic for detecting specific aflatoxins in routine inspection of foods are discussed. Some mouldy foods (cherries, strawberry jam, grapes and baby foods) contained fluorescent compounds which were not aflatoxins, but absence of aflatoxins was only demonstrated by UV or fluorescence spectroscopy. The reagent 'Echtblausalz-B' was found useful for spraying TLC plates, as specific colour compounds are formed with aflatoxins. Elution of fluorescent spots from TLC plates followed by UV spectroscopy can detect 0.01 μg aflatoxin/kg. Fluorescence spectrophotometers can record spectra directly from TLC plates, and direct fluorodensitometric quantitation is possible. Recovery of aflatoxin B_1 is 89%, s.d. 6.4% with a variation coeff. of 7.3. Similar methods can be applied to ochratoxins. Aflatoxin contents of oranges and peanuts determined during routine investigation of spontaneously moulded foods are tabulated. [See FSTA (1978) 10 12C454.] DIH

145

Occurrence and estimation of sterigmatocystin-producing strains of Aspergillus versicolor in foodstuffs. [Lecture]
Orth, R.
Zeszyty Problemowe Postepow Nauk Rolniczych No. 189, 25-33 (1977) [33 ref. En, pl, ru] [Fed. Res. Cent. for Food Preservation, Engesserstrasse 20, D-75 Karlsruhe, Federal Republic of Germany]

A. versicolor isolates obtained from a number of German foods were screened for sterigmatocystin production, and environmental factors influencing mould growth and toxin production were investigated. Of 150 strains tested, isolated mainly from meat products and spices, 90 strains produced sterigmatocystin. Toxigenicity depended on source of isolate: 100% of strains isolated from white pepper were toxigenic, whereas 29% of strains from meat and sausage products were toxigenic. Optimum conditions for toxin production were 25-30°C at pH 8. The organism cannot grow on low water activity substrates, e.g. jams, and will not produce toxin on fresh fruits, but most other foods under laboratory conditions will support growth and toxin production. General toxicological aspects of A. versicolor contamination of foods are discussed. [See FSTA (1978) 10 12C454.] DIH

146

Analysis of aflatoxin in groundnut and its products.
Basappa, S. C.; Sreenivasa Murthy, V.; Rajalakshmi, D.
Indian Journal of Technology 15 (7) 311-313 (1977) [6 ref. En] [Cent. Food Tech. Res. Inst., Mysore-570 013, Karnataka, India]

A rapid method for aflatoxin analysis in groundnut and its products is described. Aflatoxin containing food samples in 80% methanol were dialysed against 20% aqueous methanol as dialysing solvent. The toxin in the dialysate was estimated by direct extraction with chloroform and quantified by a visual fluorescence extinction method using a long wave UV light. The % of aflatoxin dialysed was linear upto 60 min and then decreased gradually. Temp. did not influence the toxin yield. Advantages of the method are: least interference with fluorescence; clean chromatograms; less changes of thermal degradation of compounds; elimination of usual clean up procedures; and selective separation of the toxin from common interfering substances. CFTRI

147

Studies on separations of aflatoxins by liquid chromatography. [Lecture]
Kmieciak, S.
Zeszyty Problemowe Postepow Nauk Rolniczych No. 189, 269-276 (1977) [10 ref. En, pl, ru] [Cent. Chem. Lab 'Polcargo', Gdynia, Poland]

Column chromatographic separation of aflatoxins from groundnuts on adsorption columns or on Sephadex was attempted. Chromatography on Sephadex G-25 gave reasonably good resolution of aflatoxins B_1 and B_2, but aflatoxin B_{2a} was present in some fractions and was absent before chromatography. Large-diam. silica gel columns gave unsatisfactory results, but good resulotion of aflatoxins B_1, B_2, G_1 and G_2 was obtained by chromatography on 50 × 0.15 cm silica gel (200/240 mesh ASTM) columns using chloroform/carbon tetrachloride (1 + 2) as eluent, or on Corasil II columns using chloroform/n-hexane/acetonitrile (80 + 20 + 0.3, v/v) as eluent. High inlet pressure could be used to increase flow rate. [See FSTA (1978) 12C454.] DIH

148

A field study of the mycoflora of the major pistachio-producing area of Turkey in relation to potential aflatoxin-producing organisms. [Lecture]
Denizel, T.
Zeszyty Problemowe Postepow Nauk Rolniczych No. 189, 47-53 (1977) [19 ref. En, pl, ru] [Nat. Coll. of Food Tech., Univ. of Reading, St. George's Avenue, Weybridge, Surrey, UK]

Samples were taken of soils, immature and mature pistachio nuts, nuts in storage, storage room and drying site debris, and nuts at dehulling, at Gaziantep, Turkey, and examined for presence of Penicillium and Aspergillus spp. Results are tabulated for each lot of samples. Immature endosperm of nuts was free of fungal contamination; mature nuts were externally contaminated with A. niger, A. flavus and A. ochraceus; nuts in storage were heavily contaminated with A. niger, and Penicillium spp.; nuts after dehulling were free of contamination. Stored nuts were examined for aflatoxin content; none was detected despite visible mould damage. A total of 186 isolates of Aspergillus and Penicillium spp. were screened for aflatoxin production; 20 isolates, all A. flavus, produced aflatoxin. Dehulling of nuts seems to remove contamination, but conditions of transport and storage probably lead to re-contamination. [See FSTA (1978) 12C454.] DIH

149

Contamination of pistachio nuts with aflatoxins while on the trees and in storage. [Lecture]
Emami, A.; Suzangar, M.; Barnett, R.
Zeszyty Problemowe Postepow Nauk Rolniczych No. 189, 135-140 (1977) [10 ref. En, pl, ru] [Regional Mycotoxin Cent., Univ. of Isfahan, Isfahan, Iran]

3 types of pistachio nuts at 2 locations in Iran were sampled on the tree at various stages of development and after 3 months of storage after harvest. No samples were contaminated before ripening. 30% of trees producing round type nuts at Isfahan were contaminated during ripening; % contamination did not increase during storage but level of aflatoxin increased 4 × to 28 μg/kg despite moisture content during storage of 5.3%. 11% of trees producing almond-shaped Badami nuts, and 22% producing round-type nuts at Rafsenjan were contaminated after ripening; aflatoxin levels in the nuts were 1-4 and 1-2 μg/kg, resp. It was concluded that aflatoxin contamination of pistachio nuts is not a storage problem, and that nuts should be sprayed with fungicide during ripening. [See FSTA (1978) 12C454.] DIH

150

Aflatoxin contamination of grains in flooded areas of Mathura, Uttar Pradesh.
Mishra, R. S.; Singh, R. S.
Current Science 47 (11) 396-397 (1978) [8 ref. En] [P.G. Dep. of Bot., Bhagalpur Univ., Bhagalpur-812 007, Bihar, India]

36 samples of wheat, mixed wheat and barley collected from flooded areas of Mathura in Uttar Pradesh, India, were analysed for aflatoxin content using TLC. Aflatoxin was present in 18 samples. Aflatoxin B_1 content ranged from 6 to 200 parts/billion and in 4 samples it was >20 parts/billion. Aflatoxins B_2, G_1 and G_2 were also detected in a few samples (<10 parts/billion). Aspergillus, Penicillium and Rhizopus spp. were found in these samples. CFTRI

151

Dynamic of aflatoxin accumulation in viable wheat grain inoculated with Aspergillus flavus NRRL 2999 and distribution of aflatoxins in milling products. [Lecture]
L'vova, L. S.; Sosedov, N. I.; Shatilova, T. I.; Shulgina, A. P.
Zeszyty Problemowe Postepow Nauk Rolniczych No. 189, 89-97 (1977) [7 ref. En, pl, ru] [All-Union Res. Inst. for Cereals & Cereal Products, Moscow, USSR]

Accumulation of aflatoxins in inoculated wheat grain was studied at temp. of 15-35° C and RH 75-90%; some resulting infected grains were milled to study aflatoxin distribution. Wheat grain used contained normal amounts of epiphytic microflora. Only traces of aflatoxins B_1 and G_1 were found in grain at RH <80% and temp. <20° C. Optimum conditions for aflatoxin (B_1 and G_1) production were 30° C and 90% RH, under which conditions there was a lag period of 3 days after inoculation before rise of aflatoxin B_1 and G_1 contents to max. levels of 19.9 and 18.1 p.p.m., resp. after 169 days. Below optimal temp. and RH, aflatoxin G_1 predominated over B_1. Lag period before rise increased with decreasing temp. and decreasing RH. Aflatoxin G_1 accumulation at 25° C showed a max. at 66 days at an RH of 90%; max. accumulation of aflatoxin B_1 under these conditions was at 126 days and was much less than max. G_1. Data showing distribution of aflatoxin B_1 content in milling products and bread are tabulated. Aflatoxin is present mainly in bran and outer endosperm layers; top-grade 78% extraction flour milled from grain containing 1.80 p.p.m. and 0.64 p.p.m. aflatoxin B_1 contained 0.89 and 0.16 p.p.m., resp. Fast conditioning reduced content in grain by 47%. Bread made from flour containing 500 parts/billion aflatoxin B_1 by the standard method and the remix method (with bromates) contained 130 and 72 parts/billion aflatoxin B_1, resp. (crumb values). Bromates inhibited destruction of aflatoxin during dough fermentation but increased high temp. destruction during baking. [See FSTA (1978) 10 12C454.] DIH

152

Aflatoxin-negative cottonseeds in bright, greenish yellow fluorescent seed locks.
Lee, L. S.; Cucullu, A. F.
Journal of the American Oil Chemists' Society 55 (7) 591 (1978) [3 ref. En] [S. Regional Res. Cent., USDA, PO Box 19687, New Orleans, Louisiana 70179, USA]

Bright, greenish yellow (BGY) fluorescent locks were removed from an aflatoxin-contaminated sample of lint cotton. Hand ginning of these fluorescent locks yielded 51 seeds, 26 with BGY linters, and 25 with nonfluorescent linters. All seeds were analysed individually for aflatoxins. 2 of the seeds with BGY lint accounted for 99.9% (2.75 μg) of the total aflatoxins. 4 other seeds each contained 0.02 μg of total toxins, and all others contained no toxins. Our results show that 88% of the seeds necessarily lost in discarded fluorescent locks would contain no aflatoxins. AS

153

Studies on Aspergillus flavus invasion of cottonseed at harvest and during storage.
Hamsa, T. A. P.

Dissertation Abstracts International, B 37 (8) 3848: Order No. 77-4126 (1977) [En] [Univ. of Georgia, Athens, Georgia 30601, USA]

Cottonseed production and storage were examined with respect to Aspergillus contamination. Boll weevils, boll rot, ginning and improper handling and storage were important factors in contamination. Contaminated seeds were not reliably detected by observation of bright greenish-yellow fluorescence. A. flavus could penetrate seeds, and apparently healthy seeds could be internally infected; all seeds studied at RH ≥75% were internally infected. A. flavus invasion was predominant at 28-37° C, other organisms predominated at lower temp. Botran streptomycin aspergillus differential agar was useful as a selective isolation medium for A. flavus - A. parasiticus. Production of aflatoxin by A. parasiticus could be increased or decreased when it was grown in competition with selected field or storage fungi. Cottonseed from Farmington and Athens (Georgia, USA), had A. flavus contamination of 13% and 9%, resp.; corresponding aflatoxin contamination levels were 20 and 17 parts/billion. DIH

154

[Occurrence and content of aflatoxin M_1 in dairy products. Possible errors in the determination of aflatoxin M_1.] Vorkommen und Gehalt an Aflatoxin M_1 in Molkereiprodukten. Störungsmöglichkeiten beim Nachweis von Aflatoxin M_1.

Weiss, G.; Miller, M.; Behringer, G.

Milchwissenschaft 33 (7) 409-412 (1978) [11 ref. De, en]

419 samples of bulk milk and 197 commercial cheese samples were examined for aflatoxin M_1 content. 79 (19%) of the milk samples and 136 (69%) of the cheese samples were positive. When aflatoxin B_1 was fed and aflatoxin M_1 excreted in milk, the dried milk and cheese made from this milk contained substances which behaved similarly to aflatoxin M_1 when analysed by the TLC method described in FSTA (1976) 8 10P1958. Positive identification of aflatoxin M_1 can be confirmed only by mass spectrometry. ASe

155

Aflatoxin M_1 in liquid and powdered milk (evaluation of methods and collaborative study). [Lecture]

Schuller, P. L.; Verhülsdonk, C. A. H.; Paulsch, W. E.

Zeszyty Problemowe Postepow Nauk Rolniczych No. 189, 255-261 (1977) [16 ref. En, pl, ru] [Nat. Inst. of Public Health, Lab. of Chem. Analysis of Foodstuffs, Bilthoven, PO Box 1, Netherlands]

Results obtained from samples of milk and dried milk (taken at retail level in the Netherlands) assayed by the method of Schuller et al. [FSTA (1974) 6 1P23] are presented and discussed. A number of published methods for TLC assay of aflatoxin M_1 in milk and dried milk were evaluated, and the method of Schuller et al. was selected for use in a collaborative study of the reliability of application of Official Methods of analysis by the Food Inspection Services. The study involved 19 laboratories in the Netherlands and 2 in the Federal Republic of Germany. A brief statistical analysis of the results of these detn. of low aflatoxin M_1 levels in milk and dried milk samples is given. Results were considered satisfactory. [See FSTA (1978) 10 12C454.] JDr

156

Identification and semi-quantitative determination of aflatoxin M_1 in milk. [Lecture]

Lemieszek, K.

Zeszyty Problemowe Postepow Nauk Rolniczych No. 189, 263-265 (1977) [8 ref. En, pl, ru] [Panstwowy Zaklad Higieny, Warsaw, Poland]

Aflatoxin M_1 has been detected and estimated using a TLC method based on that of Schuller et al. [FSTA (1974) 6 1P23]. Detection limit is 0.05 µg aflatoxin M_1/l. milk and 0.5 µg/kg dried milk, although it can be decreased to 0.025 µg/l. if a 50-ml sample instead of a 25-ml sample is used. Analysis of locally-produced liquid milk (31 samples) and spray-dried milk (13 samples) from the market did not reveal detectable amounts of aflatoxin M_1. Differences in results compared with those from other authors are ascribed to variations in detectability of the methods, climatic conditions and fodder. [See FSTA (1978) 10 12C454.] JDr

157

Aflatoxins in milk and tissues: experiments on rabbits and goats. [Lecture]

Juszkiewicz, T.; Piskorska-Pliszczynska, J.; Cybulski, W.

Zeszyty Problemowe Postepow Nauk Rolniczych No. 189, 41-45 (1977) [6 ref. En, pl, ru] [Dep. of Pharmacology & Toxicology, Vet. Res. Inst., Partyzantow 57, 24-100 Pulawy, Poland]

1 h after naturally contaminated groundnut meal containing 18 p.p.m. aflatoxin (67% B_1, 27% B_2, 4% G_1 and 2% G_2) had been administered by stomach tube to 3 lactating goats, in a single dose corresponding to 0.1 mg/kg body wt., levels of aflatoxin M_1 in milk were 60, 30 and 20 µg/l. Levels declined 24 h after dosing. About 90% of aflatoxin M_1 was secreted during the 1st 48 h, although secretion lasted for approx. 4 days. Aflatoxin M_2 was also present, as well as traces of B_1 and B_2. Results are also given of aflatoxin levels in rabbit tissues following a single oral dose of aflatoxins. [See FSTA (1978) 10 12C454.] DMK

158

Contamination of Isfahan village milk with aflatoxins. [Lecture]

Suzangar, M.; Barnett, R.

Zeszyty Problemowe Postepow Nauk Rolniczych No. 189, 35-39 (1977) [15 ref. En, pl, ru] [Regional Mycotoxin Res. & Training Cent., Univ. of Isfahan, Isfahan, Iran]

During a 2-yr period (1973 and 1974) aflatoxin levels were analysed in milk samples from (i) large-scale producers (modern methods of animal feed storage and maintenance) and (ii) farmers in villages around Isfahan (1-2 cows/farm and animal feeds stored on a dirt floor with no prior drying or processing). In 1973, 50% of 30 samples from (ii) contained 50-500 μg aflatoxin/kg, and in 1974, 56.7% of 37 (ii) samples contained 50-250 μg/kg. Milk from the large dairies showed either very low levels or none at all. The aflatoxins detected were M_1 and M_2. [See FSTA (1978) 10 12C454.]
DMK

159

The influence of aflatoxin B_1 on enzymes in milk.
Kiermeier, F.
Zeszyty Problemowe Postepow Nauk Rolniczych
No. 189, 169-175 (1977) [11 ref. En, pl, ru]
[Milchwissenschaftliches Inst., TU München, Weihenstephen, Federal Republic of Germany]

Effects of aflatoxin B_1 on milk acid phosphatase (AcP), alkaline phosphatase (AlP) and lactoperoxidase (LP) were studied in vitro and in vivo. With the isolated enzymes in aqueous solution, aflatoxin at 59 μg/ml had no effect on AlP or LP but caused activation of AcP. After feeding aflatoxin B_1 capsules to cows for 3 or 4 days at 50.5 or 43.3 mg/cow, levels of AlP and AcP rose during days 5-10 of the feeding period and fell during the following 20 days, with variable time courses. The increased AcP levels are thought to indicate lysosomal damage. Milk LP levels increased within 15 h of aflatoxin feeding, and remained elevated while toxin was secreted in the milk. The increased LP levels are thought to be due to inflammation of the tissues. [See FSTA (1978) 10 12C454.] JDr

160

[Transfer of dietary aflatoxin B_1 into eggs and its effect on egg production.]
Morimoto, H.; Aibara, K.; Noro, H.; Otaki, H.; Takagi, H.
Japanese Poultry Science [Nihon Kakin Gakkai-shi]
14 (2) 89-91 (1977) [6 ref. Ja] [Japan Sci. Feeds Ass., Tokyo 101, Japan]

161

Carry-over effect of aflatoxins into broiler meat. [Lecture]
Mintzlaff, H. J.; Lötzsch, R.; Leistner, L.
Zeszyty Problemowe Postepow Nauk Rolniczych
No. 189, 63-67 (1977) [10 ref. En, pl, ru]
[Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

Broilers were fed diets containing 0.025, 0.1, 0.5, 1.0, 2.0, 5.0, 10.0 or 15.0 p.p.m. aflatoxin B_1 for 8 wk. Diets also contained about 5 × as much aflatoxin G_1 and small amounts of B_2 and G_2. Aflatoxin B_1 residues in liver, thigh and breast were determined by the AOAC method, which is sensitive to 0.1 parts/billion (results for aflatoxin B_1 are tabulated). No residues were detectable at feed levels <0.1 p.p.m.; above this level residues in liver and thigh increased with level in feed, and residues in breast increased more slowly with level in feed. Mean levels (parts/billion) of residues of aflatoxin B_1 (with ranges in parentheses) in liver, thigh and breast, were at 0.1 p.p.m. in the feed, 0.12 (0-0.35), 0.01 (0-0.11) and 0.02 (0-0.23), resp.; and at 15.0 p.p.m. in the feed were 15.45 (9.80-21.10), 9.76 (4.80-24.20) and 6.33 (3.30-12.20), resp. Aflatoxin M_1 residue levels were of the same order as aflatoxin B_1, while G_1 levels were higher, probably reflecting feed levels. Only traces of aflatoxins B_2 and G_2 were found in broilers. [See FSTA (1978) 12C454.] DIH

162

[National Food Administration Ordinance on foreign substances in foods.]
Sweden, Statens Livsmedelsverk
Statens Livsmedelsverks Författningssamling SLV FS 1977:7, 6pp. (1977) [Sv] Box 622, S-751 26 Uppsala, Sweden

Aspects covered in this Ordinance, which came into force on 1 Jan. 1978, include: definition of terms; relation to other Swedish legislation for food hygiene; special extension of the tolerance for vinyl chloride (established in the Ordinance SLV 1974:17) up to 1 July 1978; tables of max. acceptable levels for numerous pesticides and their metabolites in fruit, potatoes and other vegetables; max. acceptable levels of sprouting inhibitors in potatoes; and max. permitted levels of aflatoxin, Pb and vinyl chloride in or on foods (with the exception of drinking water). AJDW

COPYRIGHT REGULATIONS

Form of Declaration and Undertaking

To the Editor, International Food Information Service, Shinfield,
Reading RG2 9AT, Berkshire, England.

1. I..

   of...

   Hereby request you to make and supply to me a

   Photocopy of the article covered by

   Journal name...

   Volume .... Part .... Pages .... Year ....

   which I require for the purposes of research or private study.

2. I have not previously been supplied with a copy of the said article/part of the said work by any librarian.

3. I undertake that if a copy is supplied to me in compliance with the request made above, I will not use it except for the purposes of research or private study.

   Signature .... Date ....

   (Note: This must be the personal signature of the person making the request. A stamped or typewritten signature or the signature of an agent is NOT sufficient.)

4. Send this form and remittance (10p per page) to the above address. (Minimum charge £1)

(Note: Additional forms are available on request)

Food Annotated Bibliographies

	Vol. 1-5 Price	Vol. 6-10 Price	Vol. 11 (1979) 12 monthly issues Price
1. Application of Reverse Osmosis to Food Processing	☐ £5.00	☐ £9.00	☐ £7.00
2. New Sources of Food Protein	☐ £8.00	☐ £19.00	☐ £16.00
3. Natural and Synthetic Sweeteners	☐ £5.00	☐ £10.00	☐ £8.00
4. Techniques for Analysis of Flavour Volatiles	☐ £7.00	☐ £12.50	☐ £9.50
5. Microwaves in Food Processing	☐ £4.50	☐ £9.00	☐ £7.00
6. Texture Analysis of Foods	☐ £7.00	☐ £14.00	☐ £10.50
7. Synthetic Dairy Products	☐ £4.50	☐ £9.00	☐ £7.00
8. Acidulants in Food	☐ £5.00	☐ £9.00	☐ £7.00
9. Agglomeration of Powders	☐ £4.50	☐ £9.00	☐ £7.00
10. Aseptic Packaging	☐ £4.50	☐ £9.50	☐ £8.00
11. EEC Regulations	☐ £4.50	☐ £9.00	☐ £7.00
12. Toxicology of Food Additives	☐ £4.50	☐ £10.00	☐ £8.00
13. Deep Fat Frying	☐ £6.00	☐ £12.50	☐ £9.50
14. Viscosity of Foods	☐ £6.00	☐ £9.50	☐ £8.00
15. Taste Panels in Food Science	☐ £4.50	☐ £12.50	☐ £9.50
16. Taints in Food	☐ £4.50	☐ £9.50	☐ £8.00
17. Microbial Toxins in Food	☐ £4.50	☐ £12.50	☐ £9.50
18. Smoked Food Products	☐ £5.00	☐ £9.00	☐ £7.00
19. Disposal of Waste Food Products	☐ £6.50	☐ £13.50	☐ £10.50
20. Use of Glucose in Food Products	☐ £4.50	☐ £9.00	☐ £7.00
21. Emulsifiers in Foods	☐ £5.00	☐ £9.50	☐ £8.00
22. Stabilizers in Foods	☐ £5.00	☐ £9.50	☐ £8.00
23. Staling and Antistaling Additives	☐ £4.50	☐ £9.00	☐ £7.00
24. Catering Industry	☐ £4.50	☐ £9.00	☐ £7.00
25. Antioxidants	☐ £5.00	☐ £9.50	☐ £8.00
26. Nitrosamines	☐ £4.50	☐ £9.00	☐ £7.00
27. Content and Analysis of Mercury in Foods	☐ £4.00	☐ £9.50	☐ £8.00
28. Content and Analysis of Lead in Foods	☐ £4.00	☐ £9.00	☐ £7.00
29. Heatable Packs	☐ £4.00	☐ £9.00	☐ £7.00
30. Sulphur Dioxide in Food Products	☐ £4.50	☐ £9.00	☐ £7.00
31. Lactic Acid Bacteria in Beverages and Food	☐ £6.00	☐ £12.00	☐ £9.50
32. Colorants	☐ £5.00	☐ £9.00	☐ £7.00
33. Browning of Foods	☐ £4.50	☐ £9.00	☐ £7.00
34. Aflatoxins	☐ £4.00	☐ £9.50	☐ £8.00
35, Antibiotic Properties and Residues in Food excluding Nisin	☐ £4.50	☐ £9.00	☐ £7.00
36. Nisin	☐ £4.00	☐ £9.00	☐ £7.00
37. Cadmium in Foods	☐ £4.00	☐ £9.00	☐ £7.00
38. Coffee	☐ £6.00	☐ £9.50	☐ £8.00
39. Sorbic Acid	☐ £4.00	☐ £9.00	☐ £7.00
40. Arsenic in Foods	☐ £4.00	☐ £9.00	☐ £7.00
41. Ascorbic Acid	☐ £4.00	☐ £9.00	☐ £9.00
42. Thickeners and Gelling Agents	☐ £3.00	☐ £9.00	☐ £7.00
43. Pseudomonadaceae and Food Processing	☐ £3.50	☐ £9.00	☐ £7.00
44. Spores in Food	☐ £3.00	☐ £9.00	☐ £8.00
45. Breadmaking	☐ £5.00	☐ £9.00	☐ £7.00
46. Bread Properties	☐ £4.50	☐ £9.00	☐ £7.00
47. Food Science and Technology Books	☐ £8.00	☐ £15.00	☐ £14.00
48. Nitrates and Nitrates in Meat Products	*	☐ £9.50	☐ £8.00
49. Eggs and Poultry Meat	*	☐ £15.00	☐ £11.50
50. Mycotoxins in Foods (Excluding Aflatoxins and Microbial Toxins)	☐ £3.00	☐ £9.00	☐ £7.00
51. Meat Canning	*	☐ £9.50	☐ £8.00

* Only available from Vol. 6

Prices include postage by surface mail. For airmail rates, please apply to address below.
To order, or obtain further information, mark the item required, add your name and address and send cash, cheque or postal order to :-

INTERNATIONAL FOOD INFORMATION SERVICE (IFIS)
LANE END HOUSE,
SHINFIELD, READING, RG2 9BB,
ENGLAND

Name...

Address ....

INTERNATIONAL FOOD INFORMATION SERVICE

ifis

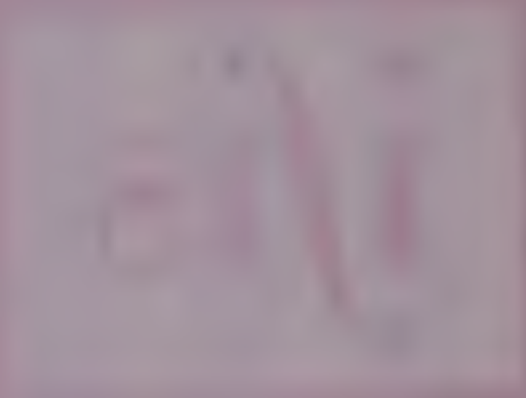
FAB 34

AFLATOXINS

SELECTED FROM VOLUME 11
FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

under the direction of

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks; Gesellschaft fur Information und Dokumentation, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen.



INTRODUCTION

Food Annotated Bibliographies (FABs) are collections of abstracts on specific topics in food science and technology. The topics are chosen by the staff of the International Food Information Service as being of particular interest or importance. The topics normally interest individual workers, who may not require the full information provided in Food Science and Technology Abstracts, from which the abstracts for FABs are taken. The size and the cost of the FABs are controlled as much as possible with the interests of individual workers in mind.

Titles of the FABs now available are given on the back cover of this booklet. For up-to-date lists of FABs or suggestions for new topics please write to the address on the back cover. New subjects are searched for at least the five most recent volumes of Food Science and Technology Abstracts. Thereafter each FAB is updated monthly. Copies of each months abstracts on any topic may be obtained as indicated on the back cover of this publication. At the end of each volume of up-dating, the abstracts are merged and made available as a separate supplement to the original FAB.

Some of the larger FABs have been divided into sections to facilitate use. FAB 47 also has a subject and author index provided.

Copies of all original articles referred to in the abstracts may be bought (or occasionally borrowed) from the International Food Information Service. A form for ordering these is provided at the end of this FAB.

Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journals, patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

EDITOR

1

Determination of aflatoxins in peanut products using reverse phase HPLC.
Hurst, W. J.; Toomey, P. B.
Journal of Chromatographic Science **16** (8) 372–376 (1978) [32 ref. En] [Hershey Foods Res. Lab., P.O. Box 54, Hershey, Pennsylvania 17033, USA]

A high performance liquid chromatographic (HPLC) method is described for detn. of the 4 major aflatoxins, B_1, B_2, G_1, and G_2, in peanut products (sweetened and unsweetened peanut butter, ground peanuts). The aflatoxins are extracted by adapting a procedure developed by Pons [personal communication (1977)] at the SRRC, USDA, and quantitated utilizing a new 5 μm reverse-phase column with NaCl/acetonitrile/methanol mobile phase (3 + 1 + 1). The 5 μm column achieved baseline resolution of each of the 4 aflatoxins. Retention times and peak heights were reproducible. The procedure was successfully applied to several types of peanut products and was applicable to both roasted and unroasted peanuts, which is a decided advantage over the current CB and BF extraction methods. Additionally, it can be used for sweetened peanut matrixes with no interferences in the chromatography. The total time required for sample preparation and aflatoxin detn. is <1.5 h. AS

2

Microbial alterations of grains, legumes, and oilseeds. [Lecture]
Beuchat, L. R.
Food Technology **32** (5) 193–198 (1978) [33 ref. En] [Dep. of Food Sci., Univ. of Georgia Agric. Exp. Sta., Experiment, Georgia 30212, USA]

The detrimental effects of fungi and bacteria on stored and processed grains, legumes and oilseeds and on bakery products are first reviewed. These detrimental effects include mycotoxin formation in stored commodities, occurrence of food poisoning bacteria in processed commodities (e.g. Bacillus cereus in cooked rice, Staphylococcus aureus in pasta, and Clostridium perfringens in meat extended with oilseed flours, concentrates or texturized proteins) and microbial (chiefly fungal) spoilage of bakery products. Consideration is then given to the beneficial effects of fungi and bacteria in traditional fermented foods (soy sauce being taken as an example) and bakery products. A flow-sheet of soy sauce manufacture is included and tables list the following: compounds produced during fermentation and/or baking, moisture contents and water activities of various grains and oilseeds at 25–30° C, antimicrobial additives used in bakery products, information on fermented products (e.g. substrates, microorganisms, nature of products), factors affecting mycotoxin formation, and min. water activities for growth of common storage fungi at 25–30° C. [See FSTA (1979) 11 1B3]. JA

3

Annual Meeting of the American Society for Microbiology in New Orleans, Louisiana, USA, May 11, 1977. [Conference proceedings]
United States of America, American Society for Microbiology
Journal of Food Protection **41** (5) 373–408 (1978) [many ref. En]

Papers presented at a seminar held at the Annual Meeting of the American Society for Microbiology are published. The papers include: Mycotoxins – a real or potential problem – introduction, by A. W. Hayes (pp. 373–374, 3 ref.); and Fallacies in our understanding of mycotoxins, by P. B. Hamilton (pp. 404–408, 12 ref.). A further 3 papers are abstracted separately and are in the FSTA author index under **United States of America**, American Society for Microbiology [Mycotoxin Symposium]. DIH

4

Interaction of mycotoxins with copper-folin reagent.
Siraj, M. Y.; Phillips, T. D.; Hayes, A. W.
Journal of Food Protection **41** (5) 370–372 (1978) [11 ref. En] [Dep. of Pharmacology & Toxicology, Univ. of Mississippi Med. Cent., Jackson, Mississippi 39216, USA]

To study the interference by mycotoxins in protein measurements, solutions of various concn. of aflatoxin B_1, citrinin, cytochalasin B, ochratoxin A, patulin, penicillic acid, rubratoxins A and B, T-2 toxin and zearalenone were tested for a positive copper-Folin reaction. Except for T-2 toxin, all mycotoxins tested developed a blue colour, characteristic of proteins, in the copper-Folin solution. The Lowry reaction for the mycotoxins was linear over the concn. range of 20–100 μg/ml for most of these toxins. Aflatoxin B_1 and citrinin at 2 μg/ml and zearalenone at 0.5 μg/ml developed a blue colour in the copper-Folin solution. The linear relationship between colour development and toxin concn. plus high sensitivity makes the copper-Folin reaction a potential analytical method for these toxins but only in the absence of protein or other copper-Folin positive materials. AS

5

[Aflatoxins and toxigenic moulds in foods consumed in Zaire.]
Masimango, N.; Ramaut, J. L.; Remacle, J.
Revue des Fermentations et des Industries Alimentaires **32** (6) 164–170 (1977) [14 ref. Fr, en, nl] [Lab. de Botanique Pharmaceutique & d'Ecologie Microbienne, Univ. de Liege, Sart-Tilman, B-4000 Liege, Belgium]

Production of aflatoxin by Aspergillus flavus requires a temp. of 25–35° C and RH ≥ 80 %. It is suspected that hepatic cell cancer is related to consumption of foods containing aflatoxin; such contamination varies seasonally and with altitude in the same region, a condition which exists in Zaire. Samples of basic foods were obtained from markets in various localities of Zaire and detn. were made of moisture content, mould contamination (with spp.); aflatoxin content and mould contamination (with spp.); detailed results are tabulated for groundnut (defatted), banana, cassava, eleusine, maize flour, sorghum, potato and sweet potato. Standard AOAC methods of analysis were used, and mould cultures were examined for dry wt. of mycelium and production of aflatoxin. Of 52 samples, 47 contained moulds of which 19 (i.e. 37 %) contained aflatoxin, 5 of them with >1 p.p.m. aflatoxin

B_1. In general, high toxin concn. was linked to high moisture content, but some inverse examples were also found. 59 mould cultures included spp. of Aspergillus, Penicillium and Mucor; details are tabulated for each culture of production of aflatoxins B_1, B_2, G_1 and G_2, with quantitative figures for B_1. Aspergillus spp. predominated but some Asp. flavus cultures produced no toxin. It is concluded that potential carcinogenic danger exists, and means of preventing mould proliferation in tropical climates should be sought as an urgent priority. ELC

6

[Review of methods for determination of aflatoxins B, G and M in foods and feed.] Übersicht über Bestimmungsmethoden der Aflatoxine B, G und M in Lebens- und Futtermitteln. [Review]
Lüthy, J.
Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 69 (2) 200–219 (1978) [106 ref. De, en, fr] [Inst. für Toxikologie der ETH, Schwerzenbach, Switzerland]

Aspects covered include physicochemical properties of aflatoxins B, B_2, G_1, G_2, M_1 and M_2; sample preparation; TLC methods; collaborative studies and experiences with particular foods; methods for identification of aflatoxins, including TLC of derivatives bioassays of toxicity and MS techniques; analysis for M-aflatoxins, especially from milk and dairy products; and new methods of analysis, including high pressure liquid chromatography and radioimmunoassay. DIH

7

Hazards of mycotoxins to public health. [Lecture]
Wilson, B. J.
Journal of Food Protection 41 (5) 375–384 (1978) [63 ref. En] [Cent. in Toxicology, Dep. of Biochem., Vanderbilt Univ. School of Med., Nashville, Tennessee 37232, USA]

Historical aspects of the association between human disease and the presence of mycotoxins in food are briefly discussed, and the role of aflatoxins as agents of human disease is reviewed on a geographical basis, including Uganda, Taiwan, Kenya, Swaziland, Mozambique, the Philippines, S.E. Asia, Senegal and India. Contaminated cereal products were the most frequent source of aflatoxins. Contamination of milk and dairy products with aflatoxin B_1, or M_1 has been reported in South Africa and the Federal Republic of Germany. Reliable analytical methods for other mycotoxins are needed, and some substances causing disease may be unrecognized as toxins. [See FSTA (1979) 11 1C5.] DIH

8

Mycotoxins in feeds and ingredients and their origin. [Lecture]
Scott, P. M.
Journal of Food Protection 41 (5) 385–398 (1978) [19 ref. En] [Health Protection Branch, Health & Welfare Canada, Ottawa, Ontario K1A, OL2, Canada]

Incidence of mycotoxins in grains, including food grains, and consequent contamination of milk and dairy products are reviewed. Incidences of occurrence of aflatoxins in milk and milk products are tabulated for various countries, with levels found and the ref. to the original paper. Natural occurrences of toxins in grains, including some food grains, are similarly tabulated for ochratoxin A (including residues found in animal products, e.g. pig and poultry muscle), citrinin, sterigmatocystin, zearalenone and trichothecenes. Chemical structures of mycotoxins are illustrated. [See FSTA (1979) 11 1C5.] DIH

9

[Mycotoxins in canned vegetables and in foods of plant origin.]
Lafont, P.; Lafont, J.
Medecine et Nutrition 14 (1) 45–48 (1978) [15 ref. Fr, en] [Unite de Recherche de Toxicologie Alimentaire, INSERM, 44 Rue du Chemin de Ronde, 78110 Le Vesinet, France]

Studies were conducted on the incidence and level of contamination of canned vegetables, sweet corn, cornflour and dried soups with mycotoxins (aflatoxins, sterigmatocystin, ochratoxin, or 12-13-epoxytrichothecenes). A table of results is given. No mycotoxins were detected in any sample of canned peas (56 samples), peas + carrots (24 samples), green beans (16 samples), mixed vegetables (26 samples) or canned soup (22 samples). 1 of 43 samples of flageolets (bean seeds) contained traces of epoxytrichothecenes. 3 samples of canned salsify contained epoxytrichothecenes, at levels of 25, 40 and approx. 60 parts/billion resp. Of 42 samples of sweet corn, 2 contained traces of ochratoxin, and 2 contained epoxytrichothecenes (1 at a concn. of 25 parts/billion, the other at trace concn.). Of 36 samples of cornflour, 1 contained aflatoxin (at 2 parts/billion) and 2 contained 12-13-epoxytrichothecenes (at 30 parts/billion or at trace concn.); and, of 40 samples of dried soup, 1 contained traces of 12-13-epoxytrichothecenes. No sterigmatocystin was detected in any sample. The significance of these results is discussed in relation to the potential health hazards. AJDW

10

[Aflatoxins in oilseeds.]
Cardillo, –.
Rivista Italiana delle Sostanze Grasse 55 (4) 98–101 (1978) [112 ref. It, en] [Sta. Sperimentale Oli & Grassi, Milan, Italy]

Recent research on aflatoxins in oilseed meals and derived food products is reviewed in sections on their chemistry and biosynthesis, prevention of fungal growth and toxigenesis, and detoxication and detn. methods. RM

11

Production of aflatoxins during storage of gamma-irradiated wheat.
Behere, A. G.; Sharma, A.; Padwaldesai, S. R.; Nadkarni, G. B.
Journal of Food Science 43 (4) 1102–1103 (1978) [15 ref. En] [Biochem. & Food Tech. Div., Bhabha Atomic Res. Cent., Bombay 400 085, India]

A correlation between RH during storage and moisture content was obtained in wheat subjected to γ-irradiation at 20 krad. The samples were assessed for storage up to 6 months with and without artificial loading of grains with conidia of Aspergillus flavus. Mycotoxin production seemed to be determined by a critical level of moisture in the grain (13%) at RH >80% at 28±2° C. Total aflatoxin produced in the irradiated grains was observed to be lower than in unirradiated controls. The amount of toxin contained in grains, artificially infected with A. flavus before or after irradiation, did not show appreciable differences. The results, while defining the storage conditions with reference to humidity, did not indicate any alterations in wheat relating to aflatoxin-producing potential. IFT

12

[Control of aflatoxins in feeds and foods.] Zur Kontrolle von Aflatoxinen in Futtermitteln und Lebensmitteln. [Review]
Mücke, W.
Ernährungs-Umschau 25 (1) 9–15 (1978) [32 ref. De, en] [Kleiststrasse 20, D-8012 Ottobrunn, Federal Republic of Germany]

The problem of aflatoxin contamination of animal feed, and consequent contamination of human food is reviewed for meat, eggs and milk with reference to aflatoxin B_1 tolerances in Federal German feed regulations. Analysis of food and feed for aflatoxin contamination is described. It is concluded that feed regulations should specify tolerances for other aflatoxins as well as B_1 as at present, and that, because of the significance to infant feeding of the presence of aflatoxin M_1 in milk, tolerances for presence of this aflatoxin in milk and milk products should be established. DIH

13

[Health hazards from aflatoxins.]
Gesundheitsgefährdung durch Aflatoxine.
Schlatter, C.
Alimenta 17 (3) 77 (1978) [De] [Eidgenössische Tech. Hochschule, Univ. Zürich, CH-8603 Schwerzenbach, Switzerland]

This lecture discusses the health hazards from aflatoxins on the basis of animal experiments, and gives figures of the incidence and levels of aflatoxin contamination of various foods (groundnuts, ground almonds, milk). The substitution of other protein sources for the groundnut meal in the rations of dairy cows is suggested. RM

14

The effect of some contaminants occurring in food on the growth of Aspergillus flavus and the production of aflatoxins.
Burzynska, H.; Maciejska, K.
Acta Alimentaria Polonica 4 (2) 119–127 (1978) [19 ref. En, pl] Panstwowy Zaklad Higieny, Warsaw, Poland]

The effect of DDT, HCH, thiuram, carbaryl, methoxychlor and dichlorvos and of compounds of Pb, Cu, Cd, Zn, As, Cr and Hg on the growth and aflatoxins production by Aspergillus flavus VIII, A. flavus NRRL-3145 and A. parasiticus NRRL-2999 was investigated. DDT stimulated the growth of the investigated strains and the production of aflatoxins. HCH, methoxychlor and thiuram decreased the production of aflatoxins and inhibited the growth of the strains, whereas, dichlorvos and carbaryl decreased only the production of aflatoxins. Cd and Cr enhanced in various degrees (dependent on the dose used and on the strain) the production of aflatoxins, without any influence on growth. Zn and Cu caused a pronounced impairment of the growth and aflatoxins production. AS

15

Aflatoxin production in blackcurrant, blueberry and strawberry jams.
Pensala, O.; Niskanen, A.; Lindroth, S.
Journal of Food Protection 41 (5) 344–347 (1978) [17 ref. En] [Tech. Res. Cent. of Finland, Food Res. Lab., Biologinkuja 1, SF-02150 Espoo 15, Finland]

Unsweetened (i.e. boiled fruit) and sweetened (20 or 44% sucrose) blackcurrant, blueberry and strawberry jams inoculated with spores of Aspergillus parasiticus NRRL 2999 were incubated at different temp. and atm for 0.5, 1, 2, and 6 months. Hyphal dry wt., pH of medium and aflatoxin production were examined. Also, the aflatoxin distribution between mould and jam layers was examined in jam with uncontrolled and controlled pH (initial pH 3.1–3.6 and 5.6 resp.) and in 20% yeast extract sucrose broth (initial pH 5.6) after 2 wk of incubation. Aflatoxin was observed in unsweetened blackcurrant and strawberry jams stored at 22° and 30° C, but not in unsweetened blueberry jam. Addition of sugar prevented production of aflatoxin in detectable amounts, although it enhanced fungal growth. Storage at 4° C resulted in a marked reduction in fungal growth. High CO_2 atm prevented production of aflatoxin in detectable amounts in blackcurrant and blueberry jams but not in strawberry jam. Raising the initial pH of the stored unsweetened jam caused an increase in aflatoxin synthesis, although the amount of fungal mycelium, in contrast, was reduced. Aflatoxin synthesis as a function of fungal growth was significantly weaker in the jams than in the yeast extract sucrose broth. The results imply that the jam raw materials, particularly blueberry, contain substances inhibiting production of aflatoxins. Alternatively, it is also possible that the jam materials contain only small amounts of nutrients necessary for synthesis of aflatoxin. AS

16

Conversion of aflatoxin B_1 to aflatoxin D_1 in ammoniated peanut and cottonseed meals.
Lee, L. S.; Cucullu, A. F.
Journal of Agricultural and Food Chemistry 26 (4) 881–884 (1978) [10 ref. En] [S. Regional Res. Centre, USDA, New Orleans, Louisiana 70179, USA]

Cultured and spiked peanut and cottonseed meals, high in aflatoxin, were ammoniated under laboratory conditions paralleling those employed for the model ammoniation of pure aflatoxin B_1, as well as under conditions used in commercial detoxification with ammonia. In the reaction, 10% aflatoxin B_1 remained after ammoniation, and 10% was converted to aflatoxin

D_1. In all ammoniation studies conducted on spiked and cultured peanut and cottonseed meals, an average of 0.36% aflatoxin B_1 was converted to aflatoxin D_1, and an average of 0.37% of the B_1 remained unreacted. AS

17

Aflatoxin contamination of peanuts resistant to seed invasion by Aspergillus flavus.
Wilson, D. M.; Mixon, A. C.; Troeger, J. M.
Phytopathology 67 (7) 922-924 (1977) [16 ref. En] [Dep. of Plant Path., Univ. of Georgia, USDA, Athens, Georgia 30601, USA]

Harvested nonshelled and shelled peanuts of accessions, P. I. 337409 and P. I. 337394 F, previously reported to be resistant to penetration and colonization by Aspergillus spp. of the A. flavus group, were held under high humidity conditions, and the aflatoxin levels that developed were compared with those reached in similarly stored peanuts of an easily colonized genotype, P. I. 343360, and a commercially grown cv., Florunner. The peanuts were not artifically inoculated, but each genotype had a natural seed infection of 2-3% by Aspergillus spp. of the A. flavus group. All genotypes had appreciable levels of aflatoxins after 9-10 days of storage in RH of 87-95% at 23-26° C. Accession P. I. 337394 F accumulated aflatoxins at 80±2% RH after 9 days at 23° C. Peanut genotypes that are penetrated with difficulty by Aspergillus spp. of the A. flavus group may have advantages in the field, but not when stored in high RH at temp. favourable for fungal deterioration. AS

18

Relation of insect damage, vector, and hybrid reaction to aflatoxin B_1 recovery from field corn.
LaPrade, J. C.; Manwiller, A.
Phytopathology 67 (4) 544-547 (1977) [6 ref. En] [Pee Dee Exp. Sta., Florence, South Carolina 29503, USA]

The relation between aflatoxin B_1 contamination of field corn and insect damage by the rice weevil (Sitophilus zeamais) under normal growth conditions was studied in 9 early maturing corn hybrids grown in a field where rice weevils caused considerable damage. Harvested ears were graded as having (i) light, (ii) moderate and (iii) severe insect damage and corresponding aflatoxin present was determined by the official AOAC method. No aflatoxin was recovered from any ear classed as (i); 12 class (ii) ears contained an average of 3 μg aflatoxin/kg, but with none in 8 ears; 32 ears in class (iii) averaged 16.2 μg aflatoxin/kg, with 8 ears aflatoxin-free; overall, 39% of naturally infested ears were positive. 7 corn hybrids (including early and late var.) were infested with weevils carrying Aspergillus flavus conidia (3 methods of artificial infection) by trapping 25 weevils/ear, with control ears protected from insect access. Only 2 or 28 ears exposed to the mould infested weevils contained detectable levels of aflatoxin. Corn ears were then inoculated with Asp. flavus conidia by forcible injection; the majority contained aflatoxin when harvested. It is concluded that (contrary to previous ideas), rice weevils are not important vectors of the mould, but produce wound damage. The wounds are then infected by wind or rain transportation of the moulds. Long season cv. produced less aflatoxin than short season hybrids. ELC

19

[Determination of aflatoxin M_1 in the raw milk consumed in Santa Maria.]
Pozzobon, E. D. T.; Chaar, J. M.; Alencastro, L. F. de; Friedrich, S. M.
Revista do Centro de Ciencias Rurais 6 (4) 423-425 (1976) [4 ref. Pt, en] [Dep. de Tecnologica Alimentar, Univ. Fed. Santa Maria, Brazil]

50 samples of commercial raw milk from Santa Maria were extracted with methanol and chloroform and the extracts examined by TLC. Aflatoxin M_1 could be detected in only 1 of the samples. JMD

20

[Determination of aflatoxins by high pressure liquid chromatography.] Aflatoxinbestimmung mit Hilfe der Hochdruckflüssigkeitschromatographie.
Koch, E.; Nothhelfer, A.; Treiber, H.
Lebensmittelchemie und Gerichtliche Chemie 32 (4) 78 (1978) [De] [Chem. Landesuntersuchungsamt Sigmaringen, Hedingerstrasse 2/1, 7480 Sigmaringen, Federal Republic of Germany]

Samples are prepared by the Bundesgesundheitsamt method as modified by Kiermeier & Weiss [see FSTA (1976) 8 10P1958], with repeated column chromatographic clean-up of the extract. Solvent residues are driven off using a stream of N_2, and the dry residue is dissolved in a benzene/acetonitrile (98:2) mixture, and analysed by high pressure liquid chromatography on a Li-Chrosorb RP-18, 10 μm column using a methanol/water (4:5) mobile phase and operating at a pressure of 60 bar. Detection limit for individual aflatoxin fractions is 0.1 parts/billion (p.p.b.) under good baseline conditions, 1 p.p.b. with severe baseline noise. Recovery of individual aflatoxin fractions is acceptable (81% for B_1, 82% for B_2, 70% for G_1 and 85% for G_2). AJDW

21

Aflatoxin is degraded by fragmented and intact mycelia of Aspergillus parasiticus grown 5 to 18 days with and without agitation.
Doyle, M. P.; Marth, E. H.
Journal of Food Protection 41 (7) 549-555 (1978) [28 ref. En] [Dep. of Food Sci. & the Food Res. Inst., Univ. of Wisconsin-Madison, Madison, Wisconsin 53706, USA]

Mycelia of Aspergillus parasiticus NRRL 2999 degraded aflatoxins B_1 and G_1. Initially 9-day-old mycelia appeared to degrade both aflatoxins effectively; however, later experiments indicated that rates at which 9-day-old mycelia degraded aflatoxins B_1 and G_1 varied even though the mycelia were produced and evaluated under similar conditions. A comparison of the ratio of rates at which mycelia of different ages degraded aflatoxins B_1 and G_1 suggests that more than one mechanism may be involved in degradation of aflatoxin by the mould. Mycelia produced when incubation was quiescent or with agitation degraded aflatoxins B_1 and G_1. Fragmenting of mycelia greatly increased their ability to degrade aflatoxin, thus suggesting that the degrading factor(s) is/are intracellular constituent(s) of the mycelium. AS

22

[The effectiveness of an Aspergillus differential medium for mycological examination of foods.] Zur Effektivität eines Aspergillus-Differentialmediums bei mykologischen Lebensmitteluntersuchungen.
Jesenska, Z.; Polakova, O.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 167 (3) 152–155 (1978) [13 ref. De, en] [Res. Inst. for Hygiene, Ul. Cs. Armady 10, 88201 Bratislava, Czechoslovakia]

The effectiveness of Aspergillus differential medium (ADM) for the identification of Aspergillus strains was tested. The bright yellow-orange pigment was produced by 205 (88.7%) of 231 strains and 97 (61.3%) of 158 strains, which during routine mycology were diagnosed as A. flavus and A. oryzae, resp. Strains of the groups A. clavatus (76), A. glaucus (100), A. fumigatus (9), A. niger (6), A. candidus (3), A. wentii (1), A. versicolor (23), A. nidulans (6), A. ustus (1) and A. terreus (1) gave negative results. Positive results were shown by 9 strains of the A. ochraceus group. It was shown that for the mycological examination of certain foods, ADM medium can make an important contribution to the identification of potential aflatoxin producers. However, it is better not to use ADM medium alone but in combination with other customary mycological nutrient media. AS

23

[Foodstuffs as a source of toxic compounds.]
Pyysalo, H.
Kemia-Kemi 5 (9) 377–379 (1978) [11 ref. Fi, en]

Although there are frequent cases of food-borne illness the number of serious cases in Finland/yr is very low. Most of the cases result from pathogenic bacteria. The most important enterotoxins in Finland are thought to be produced by Staphylococcus aureus, Clostridium perfringens and Bacillus cereus. The chief mycotoxins are aflatoxins and patulin. The most important pollutants in the Finnish diet are heavy metals, chlorinated phenols and polychlorinated biphenyls. The level of pesticides residues in Finnish foodstuffs is low. In this paper a short survey is made of the harmful compounds potentially present in foodstuffs. AS

24

The influence of metabolic inhibitors and incubation time on aflatoxin release from Aspergillus flavus.
Achmoody, J. B.; Chipley, J. R.
Mycologia 70 (2) 313–320 (1978) [22 ref. En] [Dep. of Food Sci. & Nutr. Ohio State Univ., 2121 Fyffe Road, Columbus, Ohio 43210, USA]

4 metabolic inhibitors were tested for their ability to interfere with aflatoxin release at concn. which did not inhibit growth of A. flavus in synthetic media as indicated by mycelial dry wt. detn. The amount of aflatoxin B_1 released in cultures incubated with either N,N-dicyclohexylcarbodiimide (DCCD) or NaN_3 was markedly lower than in control cultures. Toxin release was inhibited to a smaller degree by KCN and 2,4-dinitrophenol at the levels tested. Presence of the latter 2 inhibitors resulted in a delay of peak toxin release into media. Mycelial extracts from cultures incubated in the presence of DCCD contained higher amounts of aflatoxin than extracts from controls. The results suggest that an energy-dependent transport system is involved in the release of aflatoxins from A. flavus. AS

25

Fate of aflatoxin B_2 in a two-step microbial recovery system for food industry wastes.
Johnson, K. M.; Busta, F. F.
Journal of Food Science 43 (4) 1303–1306 (1978) [16 ref. En] [Dep. of Food Sci. & Nutr., Univ. of Minnesota, 1334 Eckles Avenue, St. Paul, Minnesota 55108, USA]

The fate of aflatoxin B_2 in a 2-step microbial process for the recovery of single cell protein (SCP) was determined. Bacillus subtilis A was used to hydrolyse a protein-starch medium for subsequent growth of Lactobacillus acidophilus Farr. Growth of L. acidophilus in the modified medium was 100-fold greater than in the initial medium. The medium was spiked with 800 parts/billion aflatoxin, and high pressure liquid chromatography was employed for quantification of residual aflatoxin. Extraction efficiency of the aflatoxin was 72.4%. No differences were noted in the amounts of aflatoxin present after any of the treatments. IFT

26

A comparative study on aflatoxin and chemical composition of pistachio nuts (Pistacia vera L.)
[Lecture]
Karbassi, A.; Luh, B. S.
International Congress of Food Science & Technology - Abstracts p.95 (1978) [En] [Dep. of Food Tech. & Nutr., Pahlavi Univ., Shiraz, Iran]

Effects of roasting at 170° C for 8 min on a granular salt bed on aflatoxin contamination and chemical composition of pistachio nut samples were studied. 25% of roasted kernels (2.91% moisture) and 53% of unroasted ones (9.8% moisture) were contaminated by Aspergillus flavus. It was concluded that water activities in the nuts and in the environment during storage and storage temp. are important factors affecting the growth of A. flavus. After roasting and packaging in moisture-proof airtight containers, there was no more microbial contamination. [See FSTA (1979) 11 2A60.] SP

27

Analysis of corn for aflatoxin.
Davis, N. D.; Diener, U. L.
Abstracts of Papers, American Chemical Society 176 MICR 36 (1978) [En] [Bot. & Microbiol. Dep., Auburn Univ., Auburn, Alabama 36830, USA]

A fluorometric method was developed for screening corn for aflatoxin – a carcinogen produced by Aspergillus flavus. Aflatoxin was extracted from corn meal with methanolic dichloromethane. The solvent was evaporated and the residue taken up in methanol. The solution was clarified using a reverse phase chromatography column. Fluorescence of the iodine derivative of aflatoxin was measured and the aflatoxin content of the original sample was calculated. The analysis was rapid, efficient and economical compared with AOAC official methods. Also, health and safety aspects were improved in that chloroform, benzene and hexane were not required as they are in most currently used screening methods. AS

28

[Moulds and mycotoxins in spontaneously mouldy bread.]
Andersson, A.; Josefsson, E.; Nilsson, G.; Akerstrand, K.
Var Föda 30 (3) 109–114 (1978) [18 ref. Sv, en] [Livsmedelslab., Statens Livsmedelsverk, 751 26 Uppsala, Sweden]

19 samples of white bread and 24 samples of brown bread were stored in plastics bags for 2 or 3 wk at room temp. After 2 wk, 16 samples of white bread and 9 samples of brown bread were found to be mouldy; after 3 wk, all samples of white and 16 samples of brown bread were mouldy. Predominant moulds detected were Penicillium verrucosum var. cyclopium (in 14 samples), Penicillium expansum (in 12), Aspergillus niger (in 11), and Asp. flavus (in 6). Other moulds detected included Neurospora sp., Paecilomyces sp., Penicillium brevicompactum and Penicillium roqueforti (in 2 samples each); and Asp. glaucus, Asp. versicolor, Aureobasidium sp., Mucor sp., Rhizopus sp., Penicillium chrysogenum, Penicillium janthinellum and Ulocladium sp. (in 1 sample each). The moulds and adjacent bread were tested for aflatoxins, patulin, ochratoxin A, sterigmatocystin and zearalenone. Only 1 sample contained any mycotoxin: samples from a white loaf stored for 2 wk (showing growth of Penicillium expansum) contained patulin. No patulin was detectable in samples from the same loaf after storage for 25 days. AJDW

29

The effect of aflatoxin B_1 on the morphological and biochemical properties of lactic acid bacteria for yoghurt manufacturing. [Lecture]
Sutic, M.; Banina, A.
International Congress of Food Science & Technology - Abstracts p.270 (1978) [En] [Fac. of Agric., Univ. of Belgrade, Belgrade-Zemun, Yugoslavia]

Presence of aflatoxin B_1 produced 5- to 8-fold increase in cell length of Lactobacillus bulgaricus, formation of long chains (≥ 27 cells) of Streptococcus thermophilus, and a delay of 30–90 min in the clotting time of milk by a mixture of these 2 organisms. [See FSTA (1979) 11 2A60.] CDP

30

[Action of sorbic acid against mycotoxin producing microorganisms.] Zur Wirkung von Sorbinsäure gegen Mykotoxinbildner.
Wallhäusser, K. H.; Lück, E.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 167 (3) 156–157 (1978) [7 ref. De, en] [Hoechst Aktiengesellschaft, D-6230 Frankfurt/Main, Federal Republic of Germany]

Growth of 4 strains of Aspergillus versicolor that produced sterigmatocystin was inhibited by sorbic acid in culture media at pH 5.9 and 5.7 at 400–800 p.p.m. and 200–800 p.p.m., resp. The corresponding figures for a strain of A. niger were 1600 and 800 p.p.m. Raw fermented sausages were infected with A. versicolor, and the effects of a dip in 15% potassium sorbate were studied; untreated sausages were mouldy within 6–9 days, treated sausages remained free of mould for 4 wk. DIH

31

[Inactivation of aflatoxins by ammonia. In vitro studies of detoxified groundnut meals.]
Viroben, G.; Delort-Laval, J.; Colin, J.; Adrian, J.
Annales de la Nutrition et de l'Alimentation 32 (1) 167–185 (1978) [many ref. Fr, en] [INRA, 44072 Nantes Cedex, France]

Following earlier studies showing the effect of moisture content on destruction of cystine during NH_3-detoxication of groundnut meal, 20–30 kg batches were dried to 6–7% moisture by heating to 80° C, followed by deaeration and 15 min NH_3 treatment at 95° C and 1–3 bar NH_3 pressure. Tabulated results showed that 2–3 bar NH_3 reduced aflatoxin contents by 95%, produced a slight increase in non-protein N, had no adverse effect on in vitro pepsin digestibility and slightly reduced N solubility in pH 7.5 buffer solution. The total and available lysine was not significantly affected, although cystine content was somewhat reduced (from 0.69% of DM to 0.51 and 0.47% resp. after 2 and 3 bar NH_3 treatment). The treatment also reduced fungal contamination by $>50\%$. RM

32

[Results of food control in Switzerland in 1977.] Die Durchführung der Lebensmittelkontrolle in der Schweiz im Jahre 1977.
Matthey, E.
Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 69 (3) 295–410 (1978) [De, fr]

171 295 samples of 56 types of foods, 283 samples of food additives and 824 samples of materials coming into contact with foods were analysed in 1977 by the Swiss Public Health authorities. Extracts from the reports of the official laboratories and food inspectorate are given for a number of specific foods, and results of consequent judicial proceedings are summarized. Extracts from the reports of the official laboratories are also given from the aspects of microbiological examinations (including aflatoxin detn.), and detn. of heavy metals and pesticide residues. Results for many foods are tabulated. [See FSTA (1978) 10 2A103 for 1976 report.] DIH

33

Mycotoxin producing potential of fungi associated with dry shrimps.
Wu, M. T.; Salunkhe, D. K.
Journal of Applied Bacteriology 45 (2) 231–238 (1978) [23 ref. En] [Dep. of Nutr. & Food Sci., Utah State Univ., Logan, Utah 84322, USA]

Among 114 fungi isolated from 20 dry shrimp samples, 27 isolates were capable of producing mycotoxins. Aspergillus and Penicillium were the predominant fungi. 2 of 3 Aspergillus flavus could produce aflatoxin B_1 and G_1 on yeast extract sucrose medium and on surface sterilized dry shrimps. For other toxigenic spp., toxicity was found mostly in the chloroform extracts of cultures. Visibly mouldy dry shrimps had significantly higher moisture content than the non-mouldy ones. Most of the fungi were isolated from mouldy samples. It was concluded that keeping the moisture content of dry shrimps low is the best way of preventing mould growth on these products. AS

34

Effects of ethoxyquin on aflatoxin-producing strains of Aspergillus parasiticus and A. flavus.
Foudin, A. S.; Leaich, L. L.; Ayres, J. C.
Journal of Food Science 43 (3) 731-734 (1978) [14 ref. En] [Dep. of Food Sci., Univ. of Georgia, Athens, Georgia 30602, USA]

7 isolates of A. parasiticus and A. flavus were grown for 10 days on a semi-synthetic medium containing 25-150 p.p.m. ethoxyquin antioxidant. In isolates producing B and G toxins, aflatoxin B levels increased 5-12× over that of controls, while G toxins decreased 32-97%. The increase in B toxins was not concn.-dependent, but the decrease in G toxins was. In isolates of A. flavus and A. parasiticus producing only B toxins, aflatoxin levels were depressed or remained unchanged. The effect of 100 p.p.m. ethoxyquin on 15 isolates of A. parasiticus and A. flavus, including some altered in aflatoxin-producing capability by mutation, was examined. Among wild-type isolates of A. parasiticus, G_1 decreased 90% and G_2 was completely inhibited; B_1 increased 67-1100% and B_2 increased 100-300%. Toxin synthesis was decreased 66-95% among wild-types and mutants of A. flavus and A. parasiticus producing only B toxins. Ethoxyquin apparently had little or no effect on mutants which consistently produce very low levels of the aflatoxins. The results indicate that the use of ethoxyquin as a feed additive may aggravate potential mycotoxin hazards in contaminated feedstuffs. IFT

35

[The occurrence of mycotoxins in foods.] Über das Vorkommen von Schimmelpilzgiften.
Laub, E.; Woller, R.
Verbraucherdienst, B 22 (11) 248-249 (1977) [6 ref. De] [Chem. Untersuchungsanstalt, Trier, Federal Republic of Germany]

A brief account is given of studies conducted to detect and determine aflatoxins in samples of various foods. Studies on groundnuts and groundnut products showed that: none of 59 samples of non-shelled roasted groundnuts contained aflatoxin; 9.7% of 401 retail packs of groundnut products (salted, chocolate coated, etc.) studied in 1974-1976 were aflatoxin-positive, vs. 2.7% of 184 samples studied in 1977; of 91 samples of groundnut puree-containing extruded maize samples, 20% were aflatoxin-positive; and 55% of 64 samples of groundnut-based almond substitute were aflatoxin-positive. Aflatoxins were detected in 1 of 64 samples of hazelnuts, 1 of 23 samples of pistachios, 5 of 159 samples of whole almonds, 53 of 208 samples of ground almonds, 4 of 33 samples of marzipan, and 9 of 26 samples of persipan (a marzipan-like product made from apricot or peach kernels). No aflatoxins were detected in 46 samples of walnuts, 45 samples of Brazil nuts, 50 samples of desiccated coconut, 9 samples of poppy seeds, 24 samples of sesame seeds or sesame products, and an unspecified number of samples of grain. AJDW

36

[Foods - moulds - mycotoxins.] Lebensmittel - Schimmel - Schimmelpilzgifte.
Frank, H. K.
Verbraucherdienst, B 22 (10) 217-220 (1977) [De] [Bundesforschungsanstalt für Ernährung, Karlsruhe, Federal Republic of Germany]

Aspects discussed include: the toxicity of mycotoxins; toxigenic moulds; sources of contamination with moulds; growth conditions required by toxigenic moulds; conditions for mycotoxin formation; products in which mycotoxins have been detected; the significance of mycotoxins in feeds; legal aspects; and consumer precautions. AJDW

37

[Occurrence of mycotoxins in foods and animal feeds.]
Chelkowski, J.; Godlewska, B.; Radomyska, W.
Przemysl Spozywczy 32 (8) 285-286 (1978) [17 ref. Pl, en, ru, de, fr] [Inst. Tech. Zywnosci Pochodzenia Roslinnego AR, Poznan, Poland]

The level of contamination of ground oleaginous seed and cereals imported into Poland was determined. In the foods, aflatoxin B_1 was observed in 1 out of 21 samples of wheat (8.4 µg/kg) and 1 of 24 samples of barley (15.3 µg/kg); none was observed in 24 samples of rye or in 10 samples of oats. HBr

38

Dimethyl sulfoxide reversal of aflatoxin B_1 toxicity.
Mathur, C. F.; Bortner, C.
Abstracts of the Annual Meeting of the American Society for Microbiology 78, 180 (1978) [En] [York Coll. of Pennsylvania, York, Pennsylvania, USA]

Dimethyl sulphoxide (DMSO) is commonly used as an inert solvent for aflatoxin B_1 (AFB_1) in biological experiments. In this study the toxicity of AFB_1 in 2 AFB_1 bioassay systems was examined using increasing concn. of DMSO. Growth of control and AFB_1 treated (5 mg AFB_1/ml) broth cultures of Bacillus megaterium was measured at DMSO concn. of 0.5-15 µl/ml. DMSO did not affect the growth of controls but did significantly reverse the inhibition of the AFB_1 cultures. Reversal was proportional to DMSO concn. Chick embryos were injected with 25-75 ng AFB_1/egg and 5-50 µl DMSO/egg. Viability and development of embryos were measured. AFB_1-DMSO treated embryos lived longer and developed further than AFB_1 treated embryos. In these experiments DMSO was an effective reversing agent of AFB_1 inhibition, indicating that it is not necessarily an inert carrier of the toxin. AS

39

Aflatoxin production by sclerotial and non-sclerotial strains of Aspergillus flavus and A. parasiticus.
Bennett, J. W.; Horowitz, P. C.; Horowitz, S. A.
Abstracts of the Annual Meeting of the American

Society for Microbiology 78, 180 (1978) [En] [Dep. Biol., Tulane Univ., New Orleans, Louisiana, USA]

Some reports in the literature suggest that sclerotial strains of Aspergillus flavus and A. parasiticus may be high aflatoxin producers, while other reports emphasize the unreliability of sclerotial production as a predictive cultural characteristic: 14 strains which differed in both aflatoxin- and sclerotial-producing ability were studied. Sclerotial production was assayed on 3 defined media containing different N sources. In general, sclerotial production was correlated with the strain, not the medium used. $NaNO_3$ and NH_4NO_3 supported sclerotial production while no sclerotia were produced with $(NH_4)_2SO_4$. 4 of the strains produced no detectable aflatoxin; these included 1 strain which produced abundant sclerotia, 1 strain which produced no sclerotia, and 2 strains which produced intermediate levels of sclerotia on the media tested. Among the 10 aflatoxigenic strains studied, no correlation between toxigenicity and sclerotial production could be observed. AS

40

Bioproduction of ^{14}C-ochratoxin A in submerged culture.

Lillehoj, E. B.; Aalund, O.; Hald, B.

Abstracts of the Annual Meeting of the American Society for Microbiology 78, 183 (1978) [En] [N. Regional Res. Cent., USDA, Peoria, Illinois 61604, USA]

A number of Aspergillus and Penicillium spp. were tested for production of ochratoxin A (OA) in several liquid media. After 10-day static incubations at 28° C, toxin yields of 25 μg/ml and 30 μg/ml were obtained with A. alliaceus NRRL 4181 in Raulin-Thom and in yeast extract (2%)/sucrose (4%) media, resp. However, the largest production observed in the preliminary screening was 50 μg OA/ml; this level was produced by A. sulphureus NRRL 4077 in a modified Czapek's solution. The medium contained basal salts and sucrose, plus urea (3%) and corn steep liquor (0.5% solids). A time study of toxin production demonstrated max. yield of 300 μg OA/ml by the A. sulphureus isolate in modified Czapek's medium after 11 days of static incubation at 28° C. The optimal production conditions were employed in tests designed to measure the efficiency of ^{14}C incorporation from sodium [1-^{14}C]acetate into OA. Sodium [1-^{14}C]acetate was added to separate culture flasks at 24-h intervals during the initial 9 days of the fermentation. Addition of the C-1 labelled substrate on the 4th day of incubation provided max. yield of labelled OA. The highest average specific activity was 22.5 nCi/mol. and the max. incorporation rate was 4.5%. AS

41

[Microflora of commercial crumb.]

Ichinoe, M.; Hayashi, T.; Norizuki, H.

Bulletin of the National Institute of Hygienic Sciences [Eisei Shikenjo Hokoku] 95, 92–95 (1977) [5 ref. Ja, en] [Nat. Inst. of Hygienic Sci., Tokyo, Japan]

Microorganisms associated with 30 samples of commercial crumb were examined. The number of mould colonies isolated from the samples averaged 1847/g, and ranged 2×10^1 to 2.7×10^4/g. 18 of the samples obtained averaged 7732/g and ranged from 10 to 8.4×10^4/g colonies of yeasts. The major fungi isolated were Aspergillus glaucus, A. restrictus, A. candidus, A. versicolor, Penicillium cyclopium, P. puberulum, Cladosporium, Paecilomyces and Wallemia. 17 of the samples contained total bacteria at >300 colonies/g, and 4 had $>1.8 \times 10^4$/g. No culture of coliform bacteria was found. Isolates of Aspergillus flavus and A. versicolor were grown on yeast extract-sucrose broth (YES) at 25°, for 1–2 wk, and analysed for mycotoxins using TLC. 20 isolates of A. flavus were tested for the production of aflatoxins. A single A. flavus strain produced aflatoxins in small amounts. Of 10 isolates of A. versicolor, 9 were shown to produce sterigmatocystin on YES-medium. AS

42

High pressure liquid chromatographic determination of aflatoxins in peanut products.

Pons, W. A., Jr.; Franz, A. O., Jr.

Journal of the Association of Official Analytical Chemists 61 (4) 793–800 (1978) [18 ref. En] [USDA, Sci. & Education Administration, S. Regional Res. Cent., New Orleans, Louisiana 70179, USA]

A precise and sensitive high pressure liquid chromatographic method is proposed for determining aflatoxins B_1, B_2, G_1 and G_2 in all types of peanut products. The method is based on acidified aqueous methanol extraction, partition of aflatoxins into dichloromethane, and purification of the extract on a 2 g silica gel column. Aflatoxins in the purified extract are completely resolved on a microparticulate (10 μm) porous silica gel column in approx. 10 min with a water-saturated chloroform/cyclohexane/acetonitrile solvent. The preferred detection system, B_1 and B_2 by UV absorbance at 360–365 nm and G_1 and G_2 by fluorescence, allows accurate and sensitive detection of all 4 aflatoxins at levels as low as 0.3–1.0 μg/kg. Repetitive assay of 3 samples of naturally contaminated peanut butters containing total aflatoxins ($B_1 + B_2 + G_1 + G_2$) at levels of 5, 10 and 15 μg/kg gave within-laboratory coeff. of variation of 11, 5, and 5%, resp. AS

43

Evaluation of potential for aflatoxin occurrence on celery, cauliflower, lettuce, and taro root inoculated with Aspergillus flavus and A. parasiticus.

Raghu, A.; Eadie, T.; Llewellyn, G. C.

Journal of the Association of Official Analytical Chemists 61 (4) 998–1001 (1978) [23 ref. En] [Dep. of Biol., Virginia Commonwealth Univ., Richmond, Virginia 23284, USA]

Culture samples of lettuce, cauliflower, celery, and taro root (Colocasia esculenta) were assayed for the presence of aflatoxin after inoculation with Aspergillus flavus and A. parasiticus. Cultures of A. flavus produced both aflatoxins B_1 and G_1 on taro root, but produced only B_1 on lettuce, cauliflower, and celery. For taro root, the percentage of aflatoxin G_1 produced was considerably greater than that of B_1. While A. parasiticus did produce mycelia and spores on the lettuce and taro root samples, there were no detectable levels of any aflatoxin produced. All the samples studied were successfully extracted and analysed qualitatively and quantitatively for the presence of aflatoxin by using official AOAC TLC procedures. There is sufficient evidence that aspergilli can grow on some leafy produce, and 1 strain produced aflatoxins. AS

44

Development of indices for sorting Iranian pistachio nuts according to fluorescence.
Farsaie, A.; McClure, W. F.; Monroe, R. J.
Journal of Food Science 43 (5) 1550–1552 (1978) [4 ref. En] [Dep. of Biol. & Agric. Eng., N. Carolina State Univ., Raleigh, North Carolina 27607, USA]

Study of the excitation and emission spectra of Iranian pistachio nuts was made in order to develop an index for sorting aflatoxin-contaminated nuts. The method is based on previous work which discovered that nuts emitting bright-greenish-yellow (BGY) fluorescence under long-wave UV light had a high probability of aflatoxin contamination. 6 different indices were tested: I_{490}, I_{490}/I_{470}, I_{490}/I_{420} with excitation at 360 nm; and I_{490}, I_{490}/I_{450}, I_{490}/I_{550} with excitation at 420 nm ($I =$ fluorescence intensity at indicated wavelengths). Tests clearly indicated that BGY fluorescent nuts can be separated from other nuts by electronic methods. IFT

45

New solvent mixtures for thin-layer chromatography of aflatoxin M_1.
Gasiorowska, U. W.; Strzelecki, E. L.
Journal of Chromatography 157, 445–448 (1978) [9 ref. En] [Vet. Hygiene Res. Sta., 10 Kaprow Street, 80-316 Gdansk, Poland]

Using radial TLC on silica gel GHR plates, 20 different solvent systems were examined for their ability to separate aflatoxin M_1 from interfering substances in milk. The solvent mixture hexane:light petroleum (b.p. 60–80° C): benzene:chloroform: acetone:acetonitrile:acetic acid (1:1:1:2:1:1:3) was chosen since it changed the colour of interfering substances from blue to pale green and also significantly improved the resolution and separation of aflatoxin M_1. MEG

46

Survey for aflatoxin B_1 in chicken eggs.
Stoloff, L.; Trucksess, M. W.
Journal of the Association of Official Analytical Chemists 61 (4) 995–996 (1978) [8 ref. En] [FDA, Div. of Food Tech., Washington, DC 20204, USA]

Samples of egg products were obtained during Jan. and July 1977 from 35 establishments located in the southern part of the USA. Of the 112 samples analysed, aflatoxin B_1 was found in 1 sample of liquid egg white at a level of 0.06 ng/g. No aflatoxin was found in 101 samples of shell eggs offered for sale to consumers in Alabama, Georgia, S. Carolina, and N. Carolina in the late fall of 1977. AS

47

[Determination of aflatoxin B_1 in foods and feeds.]
Cirilli, G.; Bonora, S.; Bergami, T.
Rivista della Societa Italiana di Scienza dell'Alimentazione 7 (3) 241–244 (1978) [13 ref. It] [Univ. Int. degli Studi 'G. Galilei', Pescara, Italy]

A method for detn. of aflatoxins in foods, etc. is described. The sample is extracted with saline solution, the extract is defatted with hexane, the defatted extract is treated with basic copper carbonate, decanted, re-extracted with chloroform and evaporated to dryness, and the residue is taken up in chloroform/methanol (97/3). This solution is then separated by TLC on silica gel, using a toluene/ethyl acetate/formic acid (60/32/8) solvent system. Aflatoxin flecks may be detected on the basis of their R_f values, or by spraying with H_2SO_4, HNO_3, or o-anisidine tetrazolium chloride. Aflatoxin concn. may be determined quantitatively by fluorescence measurements. AJDW

48

[Effect of the spore concentration of Aspergillus flavus on aflatoxin B_1 production in foods.]
Tantaoui Elaraki, A.
Comptes Rendus des Seances de l'Academie d'Agriculture de France 64 (1) 69–77 (1978) [6 ref. Fr] [UER des Sci. de la Vie et du Comportement, Univ., 14032 Caen Cedex, France]

The effect of spore concn. on aflatoxin production previously described in vitro [FSTA (1978) 10 9C297] was studied with 7 strains of Aspergillus flavus grown in milk and groundnuts. Samples were inoculated with suspensions containing 5–10 × 10^6 or 50–100 conidia/ml and incubated 7 days in the dark at 22–24°C, with or without agitation. Tabulated results showed considerable variations in toxigenesis under similar cultural conditions (1 to 43 fold); in milk and in stationary groundnut cultures the conc. spore suspensions resulted in low toxigenesis (12–77% of the aflatoxin production from dilute spore suspensions) while the reverse was observed in groundnut cultures with shaking. RM

49

Bisulfite degrades aflatoxin: effect of temperature and concentration of bisulfite.
Doyle, M. P.; Marth, E. H.
Journal of Food Protection 41 (10) 774–780 (1978) [31 ref. En] [Dep. of Food Sci., Univ. of Wisconsin-Madison, Madison, Wisconsin 53706, USA]

Bisulphite reacted with aflatoxins B_1 and G_1 resulting in their loss of fluorescence. The reaction was 1st order with rate depending on bisulphite (or the bisulphite and sulphite) concn. Aflatoxin G_1 reacted more rapidly with bisulphite than did aflatoxin B_1. In the presence of 0.035M potassium acid phthalate-NaOH buffer (pH 5.5) + 1.3% (v/v) methanol at 25°C, the reaction rate constant for degradation of aflatoxin G_1 was 2.23×10^{-2}/h and that for aflatoxin B_1 was 1.87×10^{-2}/h when 50 ml of reaction mixture contained 1.60 g K_2SO_3. Besides bisulphite concn., temp. influenced reaction rates. The Q_{10} for the bisulphite-aflatoxin reaction was approx. 2 while activation energies for degrading aflatoxin B_1 and aflatoxin G_1 were 13.1 and 12.6 kcal/mol, resp. Data suggest that treating foods with 50–500 p.p.m. SO_2 probably would not effectively degrade appreciable amounts of aflatoxin. Treating foods with 2000 p.p.m. SO_2 or more and increasing the temp. might reduce aflatoxin to an acceptable level. AS

50

[Effect of certain compounds on the antimicrobial properties of aflatoxin B_1.]

Boutibonnes, P.; Fischer, F. C.

Bulletin de l'Academie Veterinaire de France 51 (1) 61–68 (1978) [12 ref. Fr, en] [Lab. de Physiol. Bact. II, UER de Sci., Univ. de Caen, 14032 Caen Cedex, France]

The cytotoxic effects of aflatoxin B_1 were observed by inhibition of growth of surface cultures of Bacillus thuringiensis. Strips of filter paper impregnated with 50 µl of aflatoxin B_1 solution (200 µg/ml) were laid on the surface of the culture, the solution was allowed to diffuse into the gel for 1 h at 4°C, and then inhibition zones were measured after incubation at 20°C for 18 h. Effects of coumarin and its derivatives, food colorants, food preservatives, pesticides, other mycotoxins and some common chemical carcinogens were studied by application to the culture of filter paper strips impregnated with 50 µl of solution. Simple coumarin derivatives (50 µl of a 1000–5000 µg/ml solution) inhibited aflatoxin B_1 cytotoxicity as did most food colorants tested (20 000–50 000 µg/ml) despite their diverse chemical nature. Patent Blue V, however, increased cytotoxicity of aflatoxin B_1 as did sterigmatocystin, a mycotoxin. The other compounds tested had no significant effects. The results are discussed with respect to evaluation of the toxicity of foods contaminated by mycotoxins. DIH

51

Mycotoxic fungi, mycotoxins, mycotoxicoses. Vol. 1. Mycotoxic fungi and chemistry of mycotoxins. [Book]

Wyllie, T. D.; Morehouse, L. G. (Editors)

xxiv + 538pp. ISBN 0-8247-6550-8 (1977) [many ref. En] New York, USA; Marcel Dekker, Inc. Price FS230.00 [Dep. of Plant Path., Coll. of Agric., Univ. of Missouri-Columbia, Columbia, Missouri, 65201 USA]

This handbook contains 2 main sections: Mycology of mycotoxic fungi (pp. 1–128), giving a key to toxigenic fungi, and subsections covering the genera Aspergillus, Penicillium, Fusarium, Claviceps, Stachybotrys, Pithomyces, Phoma, Myrothecium, Phomopsis and Diplodia; and Chemistry of mycotoxins (pp. 131–469), covering aflatoxin and related compounds, coumarin and related compounds, Penicillium toxins, tremorgenic mycotoxins, Fusarium and Stachybotrys toxins, Claviceps mycotoxins, sporidesmins, slaframine, toxins of Phoma herbarum var. medicaginis, and Myrothecium toxins. A 9-pp. glossary, a 41-pp. author index to the references quoted, and a 16-pp. subject index are also included. AJDW

52

Confirmatory test for aflatoxin M_1 on a thin layer plate.

Egmond, H. P. van; Paulsch, W. E.; Schuller, P. L.

Journal of the Association of Official Analytical Chemists 61 (4) 809–812 (1978) [8 ref. En] [Lab. for Chem. Analysis of Foodstuffs, Nat. Inst. of Public Health, PO Box 1, Bilthoven, Netherlands]

The identity of aflatoxin M_1 can easily be confirmed directly on a thin layer plate by reacting aflatoxin M_1 with trifluoroacetic acid (TFA). This confirmation reaction is carried out on a thin layer plate which has been developed in 2 dimensions and used for the quantitation of aflatoxin M_1 in the sample. TFA is superimposed on the separated M_1 spot. The plate is kept in the dark for 3 min, heated to 75° C for 5 min, and given a 3rd development (in the 1st direction) with chloroform/methanol/acetic acid/water (92 + 8 + 2 + 0.8). The R_f value of the blue-fluorescent derivative is compared with that for the M_1 standard. The method was used successfully on extracts of milk, cheese, and liver. M_1 quantities on the plate as low as 0.5 ng can be confirmed by this method. The method is also suitable for simultaneous confirmation of aflatoxin B_1. AS

53

A simple solid-phase radioimmunoassay for aflatoxin B_1.

Sun, P. S.; Chu, F. S.

Journal of Food Safety 1 (1) 67–75 (1977) [11 ref. En] [Dep. of Food Microbiol. & Toxicology, Food Res. Inst., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

A solid-phase radioimmunoassay (RIA) for aflatoxin B_1 was developed. This method involves the incubation of aflatoxin B_1, both labelled and unlabelled, with immunoglobulin (IgG)-sepharose gel which was prepared by conjugation of the IgG highly specific to aflatoxin B_1 with CNBr-activated sepharose gel, followed by a filtration step. The binding capacity was determined by counting the radioactivity in the filtrate. Studies with different aflatoxin B_1 analogues revealed that the IgG-gel bound most effectively with B_1. Binding of aflatoxin B_2, G_1, G_2, and aflatoxicol to the IgG-gel was less effective in comparison with the IgG before coupling. Between 0.5 and 5.0 ng/assay, the displacement of radioactivity from the gel was directly proportional to the amount of aflatoxin B_1 present. Using a simple extraction procedure without clean-up step, the recovery yields for aflatoxin B_1 in the contaminated corn or wheat at levels of 5 parts/billion or above were >60%. AS

54

Differential production of aflatoxin on natural and heat-treated cocoa beans.

Llwewllyn[Llewellyn], G. C.; Benevides, J.; Eadie, T.

Journal of Food Protection 41 (10) 785–787 (1978) [19 ref. En] [Dep. of Biol., Virginia Commonwealth Univ., Richmond, Virginia 23284, USA]

Costa Rican-type cocoa beans were tested as a substrate for 2 known aflatoxigenic fungal species, Aspergillus flavus NRRL 3251 and A. parasiticus NRRL 2999. Natural floral growth in both cooked (autoclaved) and raw cultures failed to show aspergilli and aflatoxin as analysed by TLC. Raw, ground cocoa bean medium inoculated with both spp. of aspergilli had mycelial growth, sporulation, but no detectable levels of aflatoxin. Similarly treated but cooked (autoclaved) cocoa medium also provided for mycelial growth, and sporulation, but total aflatoxin levels were 388.1 and 2.2 µg/g of substrate for the A. parasiticus and A. flavus cultures, resp. The general results appear to support the low level of a limited number of reports of toxin contamination in natural cocoa. The simplified extraction methods used herein provided results similar to other methods. AS

55

Kojic acid synthesis by resuspended mycelia of Aspergillus flavus. (In 'Proceedings of the Sixth Joint Convention' [see FSTA (1979) 11 4L225].) [Lecture]
Pratima Bajpai; Agrawal, P. K.; Viswanathan, L.
G17–G23 (1977) [11 ref. En] [Nat. Sugar Inst., Kanpur, Uttar Pradesh, India]

Aspergillus flavus mycelia, grown on a sucrose/yeast extract medium for 4 days, were washed with sterile, distilled water, and resuspended in 0.2M phosphate buffer (pH 6.5) containing 20% sucrose or glucose. Approx. 1.75 g mycelia in 50 ml buffer produced 2.15 g kojic acid in 7 days. CFTRI

56

Effect of clarification of molasses on kojic acid fermentation. (In 'Proceedings of the Sixth Joint Convention' [see FSTA (1979) 11 4L225].) [Lecture]
Pratima Bajpai; Agrawal, P. K.; Viswanathan, L.
G25–G37 (1977) [17 ref. En] [Nat. Sugar Inst., Kanpur, Uttar Pradesh, India]

A resuspended, non-toxin producing strain of Aspergillus flavus produced low amounts of kojic acid on molasses clarified by chemical and ion-exchange methods; clarification by egg albumin slightly increased the yield. Supplementation of molasses (both clarified and unclarified) with 1% yeast extract increased kojic acid yield (max. 277%) and also reduced the fermentation time by 2–3 wk. CFTRI

57

Factors affecting formation of aflatoxin B_1 by Aspergillus flavus on Ganga-5 maize hybrid.
Om Prakash; Siradhana, B. S.
Current Science 47 (18) 695–696 (1978) [6 ref. En] [Dep. of Plant Path., Rajasthan Coll. of Agric., Udaipur, Rajasthan, India]

Ganga-5 hybrid maize seeds grown in Banswara district (Rajasthan, India) were sterilized and inoculated with A. flavus. Effect of incubation period (IP) (4, 8, 12 and 20 days), temp. (10°, 15°, 20°, 25°, 30° and 35° C), RH (0, 12.5, 25, 50, 75, 100%) and light and darkness on aflatoxin B_1 formation were studied. The optimal conditions were temp. of 25° C, IP of 12 days, RH of 100% and normal daylight. Even within 4 days aflatoxin could be formed under optimal conditions. Removal of maize from cobs and storage in a dry place would cut down aflatoxin formation. CFTRI

58

Aflatoxin B_1 formation by Aspergillus flavus on the grains of some common maize cultivars.
Om Prakash; Siradhana, B. S.
Current Science 47 (20) 783 (1978) [4 ref. En] [Dep. of Plant Path., Rajasthan Coll. of Agric., Udaipur, Rajasthan, India]

Grains from 6 maize cv. [(i) Ganga-5, (ii) VL-54, (iii) Vijay, (iv) Ganga Safed-2, (v) Maharana and (vi) Opaque] were inoculated with 1.5 ml of spore suspension (4×10^4 spores/ml) of A. flavus and incubated at 30 ± 1° C for 20 days. Aflatoxin formation (mg/g) was max. (48.08) in (iv), followed by 35.72 in (iii), 27.82 in (v), 25.07 in (ii), 17.7 in (i) and 15.45 in (vi). CFTRI

59

[Evaluation of the hygienic state of flour: hygienic considerations.]
Aureli, P.; Cerquetti, M.; Lorch, L. von
Rivista della Societa Italiana di Scienza dell'Alimentazione 7 (2) 135–140 (1978) [27 ref. It] [Istituto Superiore di Sanita, Rome, Italy]

Studies were conducted on the microbiological quality of 100 samples of commercial wheat flours. Diagrams are given showing distributions of counts of aerobic mesophiles, thermophiles, moulds, and spores of mesophiles, and a table of values is given for coliform counts. The results show counts of spoilage microorganisms and/or of organisms indicating faecal contamination were relatively high in some samples; all samples were, however, free from pathogens. Studies on moulds from the flours revealed that 20% had UV fluorescence characteristics suggestive of toxigenicity. The potential for direct testing for mycotoxins (using Bacillus stearothermophilus as a test organism) is considered. The results are discussed in relation to the hygienic quality and evaluation of flour. It is suggested that mould growth could be controlled by reduction of the moisture content of the flour. AJDW

60

Mycotoxins in foodstuffs. XI. Fate of aflatoxin B_1 during preparation and baking of whole-meal wheat bread.
Reiss, J.
Cereal Chemistry 55 (4) 421–423 (1978) [10 ref. En] [Mikrobiol. Lab., Grahamhaus Studt K.G., 6550 Bad Kreuznach, Federal Republic of Germany]

Aflatoxin B_1 was added to wholemeal wheat flour, which was used to prepare a bread dough (50 g flour + 40 g water + 2 g yeast + 1 g NaCl). The dough was mixed for 5 min, allowed to rise for 30 min and then baked for 30 min at 120° C. Aflatoxin recoveries from the flour, final dough and bread were determined by TLC, and were 45–66%, 20% and 20%, resp., for 20 µg aflatoxin/g flour [See FSTA (1978) 10 6M475 for part X.] DIH

61

Natural occurrence of trichothecenes (nivalenol, deoxynivalenol, T_2) and zearalenone in corn.
Jemmali, M.; Ueno, Y.; Ishii, K.; Frayssinet, C.; Etienne, M.
Experientia 34 (10) 1333–1334 (1978) [6 ref. En] [Service Mycotoxines, INRA, 16 Rue Nicolas Fortin, F-75013 Paris, France]

Corn samples were extracted with methanol, lipids were removed from the extract by washing with hexane, the extract was evaporated to dryness and the residue was re-extracted with methanol/chloroform (1:5). The soluble fraction was analysed by sequential TLC and GLC for mycotoxins (shown to be present by rat skin bioassay). Max. amounts of toxins found were zearalenone 10 p.p.m., nivalenol 4.28 p.p.m., deoxynivalenol 0.6 p.p.m., and T_2 toxin 0.02 p.p.m. DIH

62

Aflatoxin inactivation in corn by ammonia gas: laboratory trials.

Brekke, O. L.; Stringfellow, A. C.; Peplinski, A. J.

Journal of Agricultural and Food Chemistry 26 (6) 1383–1389 (1978) [28 ref. En] [N. Reg. Res. Cent., Agric. Res., Sci & Education Administration, USDA, Peoria, Illinois 61604, USA]

An NH_3-air mixture was recycled at 25° C through a glass column containing aflatoxin-contaminated, shelled corn until uniform distribution of NH_3 in the corn bed was achieved. After ammoniation and sealed storage at 17.6% moisture and 25° C for 14 days total reaction time, aflatoxin B_1 level was reduced from 1000 µg/kg to 10 µg/kg. Effects of varying the NH_3 addition level, corn moisture, reaction time, initial aflatoxin level in corn, and recycle gas flow were investigated. A pilot-scale experiment wherein 4.86 t of 11% moisture corn was treated with 1.1% of NH_3 reduced the corn's B_1 level from 90 µg/kg to a nondetectable level during 7 months of storage indoors. Swine feeding tests on this ammoniated corn gave good performance results. In laboratory experiments, aqueous and gaseous NH_3 appeared equally effective for inactivating the aflatoxin in corn. AS

63

Transmission of aflatoxin B_1 into the tissues of growing pigs.

Jacobson, W. C.; Harmeyer, W. C.; Jackson, J. E.; Armbrecht, B.; Wiseman, H. G.

Bulletin of Environmental Contamination and Toxicology 19 (2) 156–161 (1978) [10 ref. En] [Bureau of Vet. Med., FDA, Beltsville, Maryland 20705, USA]

8 female and 8 male pigs were fed a diet consisting of ground corn, soybean meal, linseed meal, alfalfa meal, fish meal, tankage and mineral mix, to which pure aflatoxin B_1 had been added at levels of 100, 200 and 400 µg/kg feed, for 4 wk. At the end of 4 wk the pigs were slaughtered, and blood, urine and tissues analysed. The aflatoxin residues found in the liver, muscle, blood and kidney are tabulated. From this study it appears that aflatoxin B_1 residues may be found in measurable amounts in tissues of swine fed 100, 200 and 400 µg of aflatoxin B_1/kg. VJG

64

[Natural and other toxic materials in food.]

Ammon, R.

Elelmezesi Ipar 32 (9) 328–335 (1978) [Hu, en, de, ru] [Univ. des Saarlandes Physiol.-Chem. Inst., 6650 Homburg, Federal Republic of Germany]

Aspects considered in this discussion of toxic materials in food include: pollen-derived toxic materials in honey; poisonous fungi; cyanides; tetrodotoxin in fugu fish; dinoflagellate toxins in shellfish; Clostridium botulinum toxin; staphylococcal toxin; mycotoxins; monoamine oxidase inhibitors and their interaction with dietary amines; allergens; F; As; Pb; Hg; Cd; DDT; and biphenyl. AJDW

65

Determination of some specified vegetable toxins.

Rabnott, R. A.

Journal of the Association of Public Analysts 15 (4) 116–120 (1977) [4 ref. En] [Messrs Salamon & Seaber, 13 Northumberland Alley, Fenchurch Street, London EC3, UK]

Consideration is given to the origin, toxicity and methods of detn. of certain toxins (aflatoxin, gossypol, and vinyl oxazolidone thione). Suggested modifications are made to the method of determining aflatoxin, as published in the Fertiliser and Feeding Stuffs (Amendment) Regulations 1976. No adverse comments are made on gossypol detn. using the method of Pons & Hoff-pauir [Journal of the Association of Official Analytical Chemists (1953) 37, 1108; and (1957) 40, 1068]. The method has been found to be easy to operate and has given closely reproducible results. The laboratory has been unable to obtain consistent results for the detn. of vinyl oxazolidone thione using the modified method of Walter [see Journal of the Science of Food & Agriculture (1967) 18, 510]. VJG

66

Mycotoxins in human and animal health. [Conference proceedings]

Rodricks, J. V.; Hesseltine, C. W.; Mehlman, M. A. (United States-Japan Natural Resources Program) (Editors)

xvii + 807pp. ISBN 0-930376-00-5 (1977) [many ref. En] Park Forest South, Illinois, USA; Pathotox Publishers, Inc. [FDA, Washington, DC 20204, USA]

The published proceedings of the symposium provide a comprehensive review and assessment of the status of mycotoxin research. The proceedings are divided into the following subject areas: Aflatoxins; Trichothecenes and other fusarium toxins; Zearalenone; Other mycotoxins of possible health significance; Biomedical assessment of mycotoxin risks; and Regulation and marketplace. Papers in the Aflatoxin section include Introduction, by K. Aibara (p. 6); Aflatoxins – an overview, by L. Stoloff, (pp. 7–28, 72 ref.); Aflatoxin residues from contaminated feed in edible tissues of food-producing animals, by J. V. Rodricks & L. Stoloff (pp. 67–79, 34 ref.); Biosynthesis of aflatoxin and its control, by T. A. Venkitasubramanian (pp. 83–98, 62 ref.); Aflatoxin occurrence and control during growth, harvest and storage of peanuts, by J. W. Dickens (pp. 99–105, 18 ref.); Aflatoxin control during plant growth and harvest of corn, by E. B. Lillehoj & C. W. Hesseltine (pp. 107–119, 26 ref.); Aflatoxin control during food processing of peanuts, by P. J. Tiemstra (pp. 121–137, 13 ref.); Detoxification of contaminated crops, by L. A. Goldblatt & F. G. Dollear (pp. 139–150, 58 ref.); Influence of plant genetics on colonization by Aspergillus flavus and toxin production (peanuts), by A. C. Mixon (pp. 163–172, 25 ref.); and Influence of plant genetics on toxin production in corn, by M. S. Zuber (pp. 173–179, 7 ref.). Papers in the Trichothecene section include Introduction, by H. Kurata (p. 187); Trichothecenes: overview address by Y. Ueno (pp. 189–207, 84 ref.); Chemistry and biosynthesis of trichothecenes, by C. Tamm (pp. 209–228, 81 ref.); Assay methods for trichothecenes and review of their natural occurrence, by S. V. Pathre & C. J. Mirocha (pp. 229-253, 47 ref.); and Comparative toxicities of trichothecenes, by N. Sato & Y. Ueno (pp. 295-307, 36 ref.). [Contd. in following abstr.] DIH

67

Mycotoxins in human and animal health.
[Conference proceedings]
Rodricks, J. V.; Hesseltine, C. W.; Mehlmann, M. A. (United States-Japan Natural Resources Program) (Editors)
xvii + 807pp. ISBN 0-930376-00-5 (1977) [many ref. En] Park Forest South, Illinois, USA; Pathotox Publishers, Inc. [FDA, Washington, DC 20204, USA]

[Contd. from preceding abstr.] Papers in the Zearalenone section include Introduction, by C. W. Hesseltine (pp. 341-344); Zearalenone [including structure, properties, biosynthesis, occurrence and analysis], by C. J. Mirocha, S. V. Pathre & C. M. Christensen (pp. 345-364, 71 ref.); and Assay methods for zearalenone and its natural occurrence, by O. L. Shotwell (pp. 403-413, 42 ref.). Papers in the Other mycotoxins section include Introduction, by M. Manabe (p. 417); Mycotoxins, excluding aflatoxin, zearalenone and the trichothecenes, by P. S. Steyn (pp. 419-467, many ref.); Toxigenic fungi in foods [especially soybeans, beans and peppercorns], by P. B. Mislivec (pp. 469-477, 24 ref.); Ochratoxins, by P. Krogh (pp. 489-498, 34 ref.); Rubratoxins, by A. W. Hayes (pp. 507-523, 54 ref.); Metabolites of Penicillium viridicatum, by M. E. Stack, R. M. Eppley & A. E. Pohland (pp. 543-555, 42 ref.); and Patulin, by A. Ciegler [including occurrence of patulin-producing fungi on foods] (pp. 609-624, many ref.). Papers in the Biomedical assessment section include Introduction, by S. Matsuura (p. 663); Newer approaches in assessment of environmental carcinogenesis, by H. F. Kraybill (pp. 675-686, 19 ref.); Role of metabolic studies in evaluation of mycotoxin health risks, by T. C. Campbell [including mention of problems of metabolite residues in meat, milk or eggs] (pp. 687-698, 25 ref.); and Role of epidemiology in the elucidation of mycotoxin health risks, by S. J. van Rensburg [which is concerned with human disease outbreaks caused by mycotoxin-contaminated food] (pp. 699-711, 24 ref.). Papers in the Regulation and marketplace section are Introduction, by F. R. Senti (p. 751); Mycotoxin regulation in the United States, by J. V. Rodricks & H. R. Roberts (pp. 753-757); Aflatoxin regulation by T. W. Edminster (pp. 765-771); and The FAO program and mycotoxins, by K. O. Herz (pp. 773-777). Also included are a summary of papers presented, by F. R. Senti (pp. 779-789) and a 17 pp. subject index. A further 10 papers are abstracted separately (including recommendations of panel discussions) and are in the FSTA author index under United States-Japan Natural Resources Program [Mycotoxins Symposium]. DIH

68

Reverse phase high pressure liquid chromatographic determination of aflatoxins in foods.
Beebe, R. M.
Journal of the Association of Official Analytical Chemists 61 (6) 1347-1352 (1978) [18 ref. En] [FDA, 50 United Nations Plaza, San Francisco, California 94102, USA]

A method for determining aflatoxins by high pressure liquid chromatography (HPLC) with fluorescence detection after CB extraction [for CB procedure see Official Methods of Analysis, 12th Edition (1975), AOAC, Washington DC, USA, 26.014-26.019] and cleanup was applied to various foods. Recoveries at 1-15 ng/g fortification levels from green coffee and peanut butter were 72-85 and 74-104%, resp. Precision of the method was tested for peanut butter. Other products to which the method was successfully applied include tree nuts, seeds, grains, chocolate-covered peanut butter candy, and roasted, salted-in-shell peanuts. High levels of aflatoxins found in several samples of nuts by this method were verified by the official TLC method. The advantages of this HPLC method are speed, precision, sensitivity, selectivity, and immediate chemical confirmation of aflatoxins B_1 and G_1. None of the products analysed required special cleanup procedures. Preparative-scale HPLC was used to isolate purified B_1 for toxicity testing. AS

69

Panel on aflatoxins. (In 'Mycotoxins in human and animal health' [see FSTA (1979) 11 5C268].) [Lecture]
Tulpule, P.; Manabe, M.; Jemmali, M.; Hamilton, P.; Patterson, D.
pp. 181-186 (1977) [En] [India Council of Med. Res., Nat. Inst. of Nutr., Jamai-Osmania, Hyderabad, India]

Recommendations are made about fruitful areas of aflatoxin research. These include surveys of toxigenic and non-toxigenic fungi in soils around the world and study of differences between toxigenic and non-toxigenic strains; surveys of aflatoxin in crops and food; prevention of food contamination and elimination and decontamination procedures; methods of analysis, particularly cheap and simple 'farmer's' tests; toxicity of aflatoxins and metabolites; aflatoxin metabolism; and epidemiology. DIH

70

Mycotoxin production of fungi on commercial foods. (In 'Mycotoxins in human and animal health' [see FSTA (1979) 11 5C268].) [Lecture]
Hitokoto, H.; Morozumi, S.; Wauke, T.; Sakai, S.; Kurata, H.
pp. 479-487 (1977) [En] [Dep. of Microbiol., Tokyo Metropolitan Res. Lab. of Public Health, 24-1, Hyakunin-cho, 3-chome, Shinjuku-ku, Tokyo, 160 Japan]

The ability of 27 different foods to support fungal growth and mycotoxin production was investigated. Foods were studied in (i) their natural state (dried powder or fresh as appropriate), (ii) after immersion in water for 4 h (made up to 40% moisture for dried foods) or (iii) as a suspension of 10 g food + 90 ml water. Foods were inoculated separately with strains of Aspergillus parasiticus, A. versicolor, A. ochraceus or Fusarium solani that produced aflatoxin, sterigmatocystin, ochratoxin A or T-2 toxin + diacetoxyscirpenol, resp., on liquid media. All inoculated samples were incubated at 25° C for 8-30 days and were then monitored for mycotoxin content and fungal growth. Dried sweet potato and salami were the most favourable foods for fungal growth and mycotoxin production, the 1st 3 named being produced in the natural state. The only other (i) food to support mycotoxin (sterigmatocystin) production was dried persimmon. Growth and mycotoxin production is tabulated for each food, organism and moisture condition. Foods examined include cereal noodles, beans and seeds, sea foods, spices and dried skim-milk. No mycotoxin production under any conditions was noticed on pepper seed, roasted coffee bean or cinnamon; a chloroform extract from pepper seed or cinnamon inhibited growth of the 4 fungi. DIH

71

Panel on other mycotoxins of possible health significance: Recommendations for further research. (In ‘Mycotoxins in human and animal health’ [see FSTA (1979) 11 5C268].) [Lecture]
Wilson B.; Austwick, P.; Diener, U.; Sreenivasamurthy, V.; Matsuura, S.
pp. 655–661 (1977) [En] [Vanderbilt Univ. School of Med., Nashville, Tennessee 37232, USA]

Recommendations made on areas of research on mycotoxins presenting threats to human health by contaminating food include development of analytical techniques and studies of occurrence, toxicity, etc. of tremorgenic toxins, and penicillic acid, citrinin and ochratoxin A; improvements in analytical techniques for rubratoxins and metabolites of Penicillium viridicatum; studies of incidence of patulin in foods; and surveys and development of improved analytical techniques for monitoring food contamination by aflatoxins, sterigmatocystin, toxic metabolites of P. islandicum and Aspergillus versicolor, presenting particular problems in Japan. DIH

72

Trout bioassay of mycotoxins. (In ‘Mycotoxins in human and animal health’ [see FSTA (1979) 11 5C268].) [Lecture]
Sinnhuber, R. O.; Wales, J. H.; Hendricks, J. D.; Putnam, G. B.; Nixon, J. E.; Pawlowski, N. E.
pp. 731–744 (1977) [En] [Dep. of Food Sci. & Tech., Oregon State Univ., Corvallis, Oregon 97331, USA]

A bioassay for aflatoxins or derivatives of aflatoxins in foods and feeds is described. The substance under test is incorporated into the diet of rainbow trout of the Mt. Shasta strain. This strain is particularly sensitive to induction of hepatocarcinoma by aflatoxins. Incidence of liver cancer in fish populations fed the test diet is used as an indication of content of aflatoxin or derivative, and the assay has been used to determine aflatoxins B_1, G_1 and M_1, and aflatoxical in milk, cottonseed meal, and tissues and meat of animals fed aflatoxin contaminated diets. The bioassay also detected residues of carcinogenic material, possibly aflatoxin M_1, in freeze-dried whole milk from cows fed aflatoxin-contaminated cottonseed meal that had been decontaminated with ammonia. Chemical assay showed no detectable levels of aflatoxins B_1 or M_1 in the milk. The possibility of detecting, in milk or animal tissues, toxic metabolites of aflatoxins that are not recognizable by the usual chemical assays is discussed. Preliminary findings of a trout embryo bioassay are reported; exposure of trout eggs to an aqueous solution of aflatoxin B_1 (0.5 µg/ml) for 1 h resulted in a 40% incidence of liver cancer 10 months later. This bioassay requires less toxic material than does the trout diet bioassay. DIH

73

Polarographic study of aflatoxins B_1, B_2, G_1 and G_2: application of differential-pulse polarography to the determination of aflatoxin B_1 in various foodstuffs.
Smyth, M. R.; Lawellin, D. W.; Osteryoung, J. G.
Analyst 104 (1234) 73–78 (1979) [9 ref. En] [Dep. of Microbiol., Colorado State Univ., Fort Collins, Colorado 80523, USA]

The polarographic behaviour of aflatoxins B_1, B_2, G_1 and G_2 was investigated and found to parallel closely that of coumarin and its derivatives. Differential-pulse polarography (DPP) was applied to the detn. of aflatoxin B_1 in a variety of food products (rice, corn, milk). Good agreement was obtained between the DPP method and visual comparison of the fluorescence exhibited by the aflatoxin following TLC separation. Electroactive interferences co-extracted from high lipid-containing foods were removed by separation on a Sephadex LH-20 column. AS

74

New approach to aflatoxin removal. (In ‘Mycotoxins in human and animal health’ [see FSTA (1979) 11 5C268].) [Lecture]
Aibara, K.; Yano, N.
pp. 151–161 (1977) [En] [Dep. of Biomedical Res. on Foods, Nat. Inst. of Health, 2-10-35 Kamiosaki, Shinagawa-ku, Tokyo, Japan]

A method is described for removal of aflatoxin from peanuts by extraction with methoxymethane (dimethyl ether) at room temp. in an autoclave or in pressure-tight columns. Contaminated peanuts are pulverized to pass through a 12 mesh screen, and extracted in stainless steel columns at approx. 6 kg/cm² pressure. The extract can be used for preparation of peanut oil, as aflatoxin is inactivated during refining, and methoxymethane is easily removed from the defatted product because of its low b.p. The following compositions were obtained for raw, and methoxymethane treated peanut samples, resp.: crude fat 54.8 and 0,1%; crude protein 19.7 and 54.7%; and total aflatoxins 1000 and 2.25–3.25 parts/billion. Duckling feeding tests showed no toxic effects of methoxymethane treated peanut powder. DIH

75

Distribution of aflatoxin and/or zearalenone in wet-milled corn products: a review. [Review]
Bennett, G. A.; Anderson, R. A.
Journal of Agricultural and Food Chemistry 26 (5) 1055–1060 (1978) [39 ref. En] [N. Regional Res. Cent., USDA, Peoria, Illinois 61604, USA]

The occurrence of aflatoxins and zearalenone in corn is reviewed and their significance for the wet milling process is considered. Analytical techniques suitable for detn. of mycotoxins in wet-milled corn products are described. Results of experiments are described in which naturally and artificially contaminated corn was wet-milled, and the distribution of mycotoxin among the milling fractions studied. Corn containing aflatoxin from natural or artificial contamination (120 and 638 parts/billion, resp.) on wet milling gave approx. 40% of original contamination in steepwater and solubles, approx. 50% in fibre and gluten and 1% in starch (the food fraction). Zearalenone contamination (900–9400 parts/billion) was also concentrated in feed fractions rather than starch. DIH

76

Aflatoxin in corn: a note on ineffectiveness of several fumigants as inactivating agents.
Brekke, O. L.; Stringfellow, A. C.
Cereal Chemistry 55 (4) 518–520 (1978) [9 ref. En] [N. Regional Res. Cent., USDA, Peoria, Illinois 61604, USA]

Samples from a blended sublot of a batch of naturally contaminated white corn were stored with the following fumigants in plastics bags for 7 or 14 days (dosage relative to normal recommended dose rate in parentheses): Phostoxin (releases PH_3, 5X, 25X), chloropicrin (13X), carbon tetrachloride/carbon disulphide (80:20, 4X) and acrylonitrile (5X). Aflatoxin content (μg/kg) of corn (measured after grinding to 20-mesh and blending) was, for no fumigant, B_1 230 ± 3, B_2 26 ± 2; for corn stored with fumigants B_1 content ranged from 224 ± 14 to 296 ± 16 and B_2 from 25 ± 1 to 39 ± 3. No fumigant treatment gave aflatoxin levels significantly different from the original level; previous results apparently showing a decrease due to fumigant use are attributed to sample heterogeneity. DIH

77

Mycotoxins in foodstuffs. XII. The influence of the water activity (a_w) of cakes on the growth of moulds and the formation of mycotoxins.
Reiss, J.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 167 (6) 419–422 (1978) [19 ref. En, de] [Mikrobiol. Lab. der Grahamhaus Studt KG, D-6550 Bad Kreuznach, Federal Republic of Germany]

The influence of various a_w values (high, moderate and low, e.g. 0.92, 0.87, and 0.82) of cakes ('Rührkuchen', made of wheat flour, sugar, eggs, fat and water) on the development and the mycotoxin production of Aspergillus flavus (aflatoxins), A. versicolor (sterigmatocystin), A. ochraceus (ochratoxin A), Penicillium chrysogenum (citrinin) and P. expansum (patulin) was investigated. None of the moulds was able to germinate at an a_w of 0.82. An increase of the water activity resulted in a pronounced growth of the 5 fungi. Citrinin was not formed on the cakes at all. The yields of the other mycotoxins were not markedly influenced by the a_w (0.92 or 0.87). During the development of the moulds the a_w of the substrate was lowered at first (water requirement during germination and initial growth) and subsequently increased (initiation of the secondary metabolism). [See FSTA (1978) 10 6M475 for part X.] AS

78

[The hygiene of pasta. II. Mould spore content of durum semolina and corresponding pasta.] Zur Frage der Hygiene von Teigwaren. II. Der Keimgehalt an Schimmelpilzen von Hartweizengriessen und der aus ihnen hergestellten Teigwaren.
Spicher, G.
Getreide, Mehl und Brot 32 (6) 161–164 (1978) [12 ref. De]

104 samples of semolina and 87 of pasta products from various manufacturers were analysed for mould content. Semolina samples contained 10–15 000 spores/g, mean 687/g; 33% contained ≤99/g, 25% contained 100–200/g, and 12.5% contained >1000/g. Pasta samples contained 0–7000 spores/g, with means of 385, 390 and 831/g for fresh-egg pasta, water pasta (egg free) and egg pasta, resp. (26, 20 and 41 samples). Frequency distribution of pasta contamination was 0–100 spores/g 33%, 100–300/g 37%, 300–1000/g 16%, >1000/g 14%. Microbiological quality of pasta varied with manufacturer, especially for egg pasta. Composition of the mycoflora found is tabulated; genera found in order of frequency were Aspergillus > Penicillium > Mucor, Cladosporium, Rhizopus. Relative frequencies of Cladosporium and Mucor changed from semolina to pasta, Cladosporium becoming relatively unimportant in pasta. Aspergillus flavus was detected with varying frequency in semolina and pasta (100% of pasta samples from 1 manufacturer were contaminated by A. flavus). Aflatoxin was not detected in semolina, but traces of aflatoxin B_2 were detected in 3 pasta samples, in all cases at levels <5 parts/billion (permitted tolerance). [See FSTA (1977) 9 5M567 for part I.] DIH

79

[National Food Administration Ordinance on foreign matter in foods.]
Sweden, Statens Livsmedelsverk
***Statens Livsmedelsverks Författningssamling* SLV FS 1978:34** 12pp. (1978) [Sv]

This Ordinance, which came into force on 1 March 1979, specifies max. permitted levels for aflatoxins (0.005 mg/kg for all foods); Sn (150 mg/kg in grape or apple juice, 250 mg/kg in other foods); and vinyl chloride (0.01 mg/kg for all foods). Max. acceptable levels are specified for numerous pesticides and their metabolites in fruit, vegetables, and cereal products, for plant regulators in potatoes, and for Pb in a wide range of foods. AJDW

80

Mycotoxicosis produced in rats by cultural products of an isolate of Aspergillus ochraceus.
Zimmermann, J. L.; Carlton, W. W.; Tuite, J.
Food and Cosmetics Toxicology 16 (5) 449–461 (1978) [47 ref. En] [Dep. of Vet. Microbiol., Path. & Public Health, School of Vet. Med., Purdue Univ., W. Lafayette, Indiana 47907, USA]

A description is given of the mycotoxicosis produced in rats fed diets containing a rice culture or fungal mat of A. ochraceus for 5 wk. The ground rice culture was mixed with a commercial purified diet at concn. of 5, 7.5 and 10% and the fungal mat at concn. of 1, 2 and 3%. VJG

81

Production of aflatoxins and other fluorescent metabolites by strains of Aspergillus flavus isolated from staple foods and their toxicity to rats.
Angsubhakorn, S.; Bhamarapravati, N.; Romruen, K.; Phienpichit, L.; Thamavit, W.; Sahaphong, S.
Food and Cosmetics Toxicology 16 (5) 427–430 (1978) [7 ref. En] [Dep. of Path., Fac. of Sci., Mahidol Univ., Bangkok, Thailand]

40 strains of Aspergillus flavus isolated from food marketed in Thailand between 1967 and 1969 were re-isolated for toxicological characterization. Approx. 92% produced aflatoxin B_1 or aflatoxins B_1 and B_2. Neither aflatoxin G_1 nor aflatoxin G_2 was detected in this group of A. flavus isolates, but 18 unidentified blue and green fluorescent spots with various R_F values were observed on the chromatograms of 18 of the isolates. The greatest quantities of aflatoxin were 2780, 2030 and 1900 µg total aflatoxin B_1 and B_2. In acute toxicity tests in rats, 87.5% of the orally intubated chloroform extracts of the isolates caused at least 1 death in test groups of 5 rats, compared with 38% of the intraperitoneal-administered petroleum ether-insoluble fractions. VJG

82

Molds, mycotoxins, and mycotoxicoses.
Christensen, C. M.; Mirocha, C. J.; Meronuck, R. A
Cereal Foods World 22 (10) 513–516, 518–520 (1977) [4 ref. En] [Dep. of Plant Path., Univ. of Minnesota, St. Paul, Minnesota 55108, USA]

Some of the salient features of the more common mycotoxins and mycotoxicoses are summarized under the headings: Fusarium toxins and toxicoses (zearalenone and the estrogenic syndrome, T-2 toxin and other trichothecenes, refusal factor and vomitoxin); afiatoxin and aflatoxicoses (the fungus, aflatoxin production, competing microflora, high aflatoxin risk crops, durability and potency of aflatoxin, ochratoxin); ergot and ergotism; and corn smut. Symptoms in animals caused by consumption of toxic feeds are diagnosed, and means of controlling them suggested. VJG

83

Intracellular concentrations of cAMP and cGMP in an aflatoxigenic strain of Aspergillus parasiticus.
Applebaum, R. S.; Buchanan, R. L.
Journal of Food Science 44 (1) 116–117, 122 (1979) [21 ref. En] [Dep. of Nutr. & Food Sci., Drexel Univ., Philadelphia, Pennsylvania 19104, USA]

The present study was undertaken to initiate the characterization of the possible regulatory roles of cyclic nucleotides in an aflatoxigenic strain of A. parasiticus. Intracellular levels of cAMP and cGMP were determined using nonagitated cultures of A. parasiticus NRRL 2999 grown in basal medium containing 10, 60 and 100 g glucose/l. All cultures displayed the Yin-Yang behaviour associated with cyclic nucleotides, however, a reversal in their characteristic roles was demonstrated, with elevated cAMP levels occurring during exponential growth and cGMP levels increasing in association with phase transition and the early stationary phase. The cultures were also monitored for aflatoxin accumulation and glucose utilization. Initiation of aflatoxin accumulation occurred during phase transition, and coincided with an acceleration in the rate of glucose utilization. IFT

84

Mycotoxins in foods and feeds – their detection, estimation, preventive and curative measures. [Review]
Pruthi, J. S.
Bulletin of Grain Technology 16 (1) 51–68 (1978) [60 ref. En] [Cent. Food Tech. Res. Inst., Exp. Sta., Ludhiana-6, Punjab, India]

The review discusses the following topics: survey of aflatoxin contamination; contamination of food grains and of peanut oil; human health hazards; animal health hazards; isolation and characterization of aflatoxins; detection and estimation techniques; factors affecting aflatoxin formation; preventive or control measures (drying, use of fumigants/fungicides, hermetic storage and controlled atmosphere, radiation); and methods of detoxification (criteria for detoxification; physical separation; air separation; mechanical/electrical sorting; effect of heat by solvent extraction; chemical inactivation, reaction with NH_3, reaction with methylene/H_2O_2, ozonization, microbiological method; alkali refining and bleaching of vegetable oils). CFTRI

85

Effect of various glycolytic and TCA intermediates on aflatoxin production.
Buchanan, R. L.; Ayres, J. C.
Journal of Food Safety 1 (1) 19–28 (1977) [12 ref. En] [Dep. of Food Sci., Univ. of Georgia, Athens, Georgia 30602, USA]

The effects of pyruvate, succinate, citrate, α-ketoglutarate, fumarate, malate, lactate, and glycerol supplementation (0.5, 1.0, and 2.0 g/100 ml) on aflatoxin production by Aspergillus parasiticus NRRL 2999 were examined in synthetic and semi-synthetic media. Glycerol, lactate, and the 0.5 g/100 ml level of pyruvate stimulated production in the synthetic medium. At the 2.0 g/100 ml level, pyruvate, citrate, α-ketoglutarate, fumarate and malate inhibited aflatoxin accumulation in both media. With the exception of glycerol, all supplements stimulated sporulation and elevated the pH of the cultures. AS

86

High-performance liquid chromatography of aflatoxins with fluorescence detection.
Manabe, M.; Goto, T.; Matsuura, S.
Agricultural and Biological Chemistry 42 (11) 2003–2007 (1978) [14 ref. En] [Nat. Food Res. Inst., Min. of Agric. & Forestry, Tokyo, Japan]

Aflatoxins B_1, B_2, G_1 and G_2 were quantitatively detected by high-performance liquid chromatography using a 12 µl flow-cell in the fluoremetric detector and as mobile phase, a toluene system instead of a chloroform, dichloromethane or methanol system. Various kinds of columns and mobile phases were tested, and fine mutual separation of all the 4 aflatoxins without quenching their fluorescence was achieved by using a silica gel column and toluene/ethyl acetate/formic acid/methanol (89.0:7.5:2.0:1.5 by vol.). The relationship between the fluorescence peak àrea and the amount injected was linear in the range 0.3–120 ng. This method, as applied to food (rice, corn, peanut meal) and feed extracts, is sensitive at the 10–20 parts/billion levels of the 4 kinds of aflatoxins. AS

87

FDA proposed guidelines for aflatoxin.
Anon.
Cereal Foods World 22 (10) 532–533, 541 (1977) [11 ref. En]

Proposed tolerance guidelines for aflatoxin in peanut and peanut products are presented as they relate to subsequent guidelines for cereals and cereal products. VJG

88

Mycotoxins – corn-related problems.
Shotwell, O. L.
Cereal Foods World 22 (10) 524–527 (1977) [En] [USDA, Northern Regional Res. Cent., Peoria, Illinois 61604, USA]

Consideration is given to the mycotoxins causing most concern in corn, namely, aflatoxins, zearalenone, trichothecenes and ochratoxins. The incidence, levels and methods of detn. of the mycotoxins are examined. Ways of monitoring corn for aflatoxin and of detoxifying aflatoxin-contaminated corn are discussed. VJG

89

Bisulfite degrades aflatoxin: Effect of citric acid and methanol and possible mechanism of degradation.
Doyle, M. P.; Marth, E. H.
Journal of Food Protection 41 (11) 891–896 (1978) [15 ref. En] [Dep. of Food Sci., Univ. of Wisconsin-Madison, Madison, Wisconsin 53706, USA]

Citric acid retarded degradation of aflatoxins B_1 and G_1 by bisulphite. Replacement of potassium acid phthalate(KHP)-NaOH with citric acid-NaOH in the mixture of buffer (50 ml, 0.035 M)/methanol (0.65 ml)/0.8 g K_2SO_3, pH 5.5, at 25°C resulted in a decrease from 9.76×10^{-3}/h to 2.47×10^{-3}/h and from 1.19×10^{-2}/h to 4.32×10^{-3}/h in rate of degradation of aflatoxin B_1 and G_1, resp. Methanol also retarded degradation of aflatoxin by bisulphite. Increasing the methanol concn. from 1.3 to 10.0% (v/v) in 50 ml of 0.035M KHP-NaOH buffer, pH 5.5, +0.40 g K_2SO_3, resulted in a decrease in rate constants from $4.26 \times |10^{-3}$/h to 2.16×10^{-3}/h for aflatoxin B_1 and from 5.54×10^{-3}/h to 2.98×10^{-3}/h for aflatoxin G_1. Presence of citric acid and various concn. of methanol also reduced rates at which free bisulphite concn. changed. From these observations, known effects of methanol and probable effects of citric acid on bisulphite oxidation, it is suggested that degradation of aflatoxin by bisulphite is dependent on bisulphite oxidation. [^{14}C]aflatoxin B_1 was treated with K_2SO_3 at pH 5.5. and allowed to react for 96 h. Most of the degradation product(s) were in the water soluble phase, indicating that a structural modification of aflatoxin occurred. AS

90

[Survey of aflatoxin and ochratoxin A in French maize of 1973 and 1974.]
Galtier, P.; Jemmali, M.; Larrieu, G.
Annales de la Nutrition et de l'Alimentation 31 (3) 381–389 (1977) [many ref. Fr, en] [INRA, 180 Chemin de Tournefeuille, 31 300 Toulouse, France]

924 samples of maize harvested in 1973 and 1974 were analysed for aflatoxin and ochratoxin A. Tabulated results showed 1 sample (0.1%) with aflatoxin, and 18 samples (1.9%) with >15 parts/billion ochratoxin A (6 samples with 120–200 parts/billion). The known ochratoxinogenic strain Aspergillus ochraceus was isolated. The toxin concn. was considered to be too low to cause acute or toxic mycotoxicosis (due mainly to dilution with uncontaminated grain). RM

91

Absence of varietal and "form" differences in aflatoxin accumulation in coconut.
Samarajeewa, U.; Arseculeratne, S. N.; Bandunatha, C. H. S. R.
Indian Journal of Agricultural Sciences 47 (12) 591–594 (1977) [10 ref. En] [Dep. of Microbiol., Fac. of Med., Peradeniya Campus, Univ. of Sri Lanka, Peradeniya, Sri Lanka]

9 'forms' of coconut belonging to 3 var. were examined for their resistance of the growth of Aspergillus parasiticus NRRL 2999 and for accumulation of aflatoxin B_1 by in vitro cultures for 14 days on whole endosperm cups and on grated coconut. All the 'forms' tested accumulated > 50 p.p.m. toxin and none were resistant to aflatoxin production. CFTRI

92

[Detoxification of aflatoxin and sterilization of mycotoxin-producing fungi in peanut meal using ammonia gas on a laboratory scale.]
Manabe, M.; Minamisawa, M.; Matsuura, S.
Report of the National Food Research Institute [Shokuryo Kenkyusho Kenkyu Hokoku] No. 33, 65–69 (1978) [9 ref. Ja, en] [Nat. Food Res. Inst., Min. of Agric. & Forestry, Tokyo, Japan]

Peanut meal containing aflatoxin, (127 parts/10^9) was detoxified by treatment with ammonia gas in a 4 l. glass desiccator. Aflatoxin B_1 concn. was reduced by half by treatment with 13.1% (w/w) ammonia gas at 20°C for 24 h, and after 144 h the concn. was 19 parts/10^9, a reduction of 85%. Bioassay revealed decreasing toxicity with longer treatment, showing that the ammonia was not producing new toxins in the meal. 0.7% ammonia at 20°C for 24 h was sufficient to kill conidia of Aspergillus flavus NRRL 3000, A. ochraceus 0458, and A. versicolor 0056. [From En summ.] JRR

93

Toxin removal.
Degesch GmbH
British Patent 1 529 027 (1978) [En]

A process is described for treatment of mouldy foods to neutralize toxic products, such as peanut aflatoxins, which comprises treatment with ethylene oxide and/or methyl formate in a moist medium. IFT

94

Aflatoxin removal.
Asahi Kasei Kogyo Co. Ltd.
British Patent 1 522 232 (1978) [En]

A process is described for removal of aflatoxin from groundnuts, cereals, and oilseeds by extraction with dimethyl ether which may optionally be mixed with water, avoiding denaturation of proteins. IFT

95

[Occurrence of aflatoxins in hazelnuts.] Vorkommen von Aflatoxinen in Haselnüssen. [Lecture]
Senser, F.
Lebensmittelchemie und Gerichtliche Chemie 32 (6) 131 (1978) [3 ref. De] [Deutsche Forschungsanstalt für Lebensmittelchem., 8046 Garching, Federal Republic of Germany]

Studies on aflatoxins in 96 1-kg samples of high-quality hazelnuts are described. Analysis of a 50 g random subsample from each nut sample failed to reveal any aflatoxin-contaminated kernels. If only mouldy or damaged kernels were studied, aflatoxins were detected in 15 of the 96 batches of nuts; no aflatoxin was detectable in any of the samples after removal of mouldy or damaged nuts. Overall, only 1 of the 96 batches of nuts exceeded the tolerance for aflatoxins in the Federal Republic of Germany. [See FSTA (1979) 11 6G466.] AJDW

96

[Aflatoxins in grain.]
Chrzanowska, H.
Przeglad Zbozowo-Mlynarski 22 (7) 19–21 (1978) [25 ref. Pl] [Cent. Lab. Tech. Przetworstwa i Przechowalnictwa Zboz, Warsaw, Poland]

The Fungi imperfecti moulds are able to synthesize biologically active substances such as vitamins, antibiotics and toxins. Aflatoxins (Afla) are produced by Aspergillus flavus and A. parasiticus; these produce 8 Afla. viz. B_1, B_2, G_1, G_2, M_1, M_2, B_{2a}, G_{2a}, at 25–30° C. Afla may occur anywhere where conditions favourable for A. flavus and A. parasiticus development exist. B_1 is the most carcinogenic of all Afla named. The strong toxicity of Afla has been documented by experiments carried out with animals. The Afla hazard is an impetus for several countries to discuss ways of restricting them in foods and fodder. Dry grain is adverse for aflatoxigenic moulds propagation resulting in Afla formation. Importance of storing dry grain is emphasized. STI

97

[Determination of the potential for mycotoxin contamination of pasta products.]
Stoloff, L.; Trucksess, M.; Anderson, P. W.; Glabe, E. F.; Aldridge, J. G.
Tecnica Molitoria 29 (11) 793–797 (1978) [22 ref. It, en] [Bureau of Foods, FDA, Washington, DC 20204, USA]

See FSTA (1978) 10 9M884 for original En version.

98

[Mycotoxins in cheese.] Zur Frage der Mykotoxine in Käse. [Review].
Sieber, R.
Schweizerische Milchzeitung 104 (92) 683–684; (96) 714 (1978) [73 ref. De] [Eidgenössische Forschungsanstalt für Milchwirtschaft, Liebefeld-Bern, Switzerland]

This review-type article deals with distribution of milk aflatoxin M_1 during cheesemaking; its behaviour during ripening and storage; its presence in ripe cheese; means of avoiding contamination of cheese with aflatoxin M_1; factors determining mycotoxin formation; model experiments on mycotoxin formation in cheese; and incidence of mycotoxins in cheese. It is concluded that contamination of cheese by aflatoxin M_1 may be avoided by ensuring its absence from cattle feeds; and that there is no danger of mycotoxin formation in cheese in storage at ≤ 16°C and 72–78% RH under good care conditions. SKK

99

[Limitation of the content of aflatoxins in foods for human consumption.]
Frayssinet, C.; Jemmali, M.
Medecine et Nutrition 12 (5) 321–323 (1976) [Fr] [7, Rue Guy Mocquet, 94800 Villejuif, France]

Aspects discussed include: synthesis of aflatoxins by Aspergillus flavus; toxicity of aflatoxins (with reference to animal feeding trials and epidemiological investigations); commonly-contaminated foods, and levels of contamination; problems with detn. of aflatoxins; and recommended limits for tolerable aflatoxin concn. in foods. AJDW

100

Sampling, preparation and chemical analysis of meat and meat products and of eggs and egg products suspected of containing aflatoxin residues. [Review]
Lötzsch, R.
Fleischwirtschaft 58 (4) 594–598 (1978) [En] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

See FSTA (1978) 10 9G545.

101

[Effect of water activity (a_w value) on aflatoxin and patulin formation.] Bildung von Aflatoxinen und Patulin in Abhängigkeit von der Wasseraktivität.
Lötzsch, R.; Trapper, D.
Fleischwirtschaft 58 (12) 2001–2007; 1975 (1978) [43 ref. De, en] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

10 toxigenic strains of Aspergillus flavus, A. parasiticus and Penicillium griseofulvum were examined for growth and toxin formation on various semi-synthetic media at $a_w > 0.99$ to 0.80. Growth and toxin concn. were determined at 4-day intervals during 16 days incubation. Tabulated results showed that aflatoxin-producing moulds were still able to grow at a_w 0.82, patulin-producers at 0.84. Aflatoxin and patulin formation was observed to a_w 0.82 and 0.88 resp. The toxin formation was not always parallel to the growth

curve, so that the risk of mycotoxin contamination of foods is better estimated from the a_w value than from the amount of mould growth. Other factors (temp., time, strain, substrate components and pH) also affect the mycotoxin concn. Application of the results of these model experiments to intermediate-moisture foods (IMF) shows that aflatoxin presents a greater risk than patulin, though no aflatoxin formation need be expected at $a_w < 0.80$ even without fungistatic agents. RM

102

The parasexual cycle in Aspergillus parasiticus.
Papa, K. E.
Mycologia 70 (4) 766–773 (1978) [20 ref. En] [Univ. of Georgia, Athens, Georgia 30602, USA]

6 diploids of A. parasiticus involving 12 genetic markers were analysed by means of the parasexual cycle. Analysis of 2 mutants impaired in aflatoxin production revealed the independent segregation of genes involved in its biosynthesis. RM

103

Occurrence of aflatoxin in hypoallergenic milk substitutes.
Hayes, A. W.; Unger, P. D.; Stoloff, L.; Trucksess, M. W.; Hogan, G. R.; Ryan, N. J.; Wray, B. B.
Journal of Food Protection 41 (12) 974–976 (1978) [13 ref. En] [Dep. of Pharmacology, Univ. of Mississippi Med. Cent., Jackson, Mississippi 39216, USA]

Aflatoxin B_1 was detected, and its identity confirmed, in hypoallergenic milk substitutes composed, among other things, of the following ingredients susceptible to possible aflatoxin contamination: soy protein isolate, soy and coconut oils, cornstarch, and corn syrup. Except for 1 detn., all findings were under 1 ng aflatoxin/ml formula at drinking concn. Manufacturers' reserve samples of soy protein isolate, the ingredient thought to be the most likely source of the aflatoxin, were found to be uncontaminated. Reserve samples of other ingredients were not examined. Because hypoallergenic formula may be the major nutrient of an individual with a metabolic defect at infancy, a vulnerable stage of life, available control measures should be used to avoid aflatoxin-contaminated ingredients. AS

104

Rapid chemical confirmation method for aflatoxins B_1 and G_1 by direct acetylation on a thin layer plate before chromatography.
Cauderay, P.
Journal of the Association of Official Analytical Chemists 62 (1) 197 (1979) [8 ref. En] [Tech. Assistance Co. Ltd., Control Lab. of Nestle Products, La Tour-de-Peilz, Switzerland]

A method of acetylation of aflatoxins B_1 and G_1 before identification is described. Extracts containing aflatoxin B_1 and/or G_1 are spotted on a silica gel TLC plate and overspotted with acetic anhydride and HCl. After reaction, the plate is developed and the R_f values of reacted aflatoxin B_1 and/or G_1 compared with those of authentic standards treated similarly. The procedure has been successfully applied to a variety of samples such as peanuts, pistachios, hazelnuts and almonds. AS

105

Aflatoxin production in regular and decaffeinated coffee beans.
Nartowicz, V. B.; Buchanan, R. L.; Segall, S.
Journal of Food Science 44 (2) 446–448 (1979) [En] [Dep. of Nutr. & Food Sci., Drexel Univ., Philadelphia, Pennsylvania 19104, USA]

The production of aflatoxin B_1 and G_1 in regular and decaffeinated coffee beans (green and roasted) inoculated with Aspergillus parasiticus was examined to determine the effect of decaffeination on aflatoxigenic potential. Aflatoxins were not detected in either the inoculated green or roasted regular beans. Small amounts of aflatoxin (0.30 µg/g) were detected in roasted decaffeinated samples, while high levels of aflatoxins ($\leq$ 60 µg/g) were detected in green decaffeinated samples. A sample of commercially decaffeinated green coffee beans was also found to support the production of aflatoxin. The data indicate that extra precaution should be employed to assure the safety of decaffeinated coffees. IFT

106

[The influence of the type of cellulose on the aflatoxin B_1 absorption characteristics of filter sheets containing asbestos.] Der Einfluss der Zellstoffart auf das Adsorptionsverhalten asbesthaltiger Filterschichten gegenüber Aflatoxin B_1.
Postel, W.; Görg, A.; Günther, E.
Brauwissenschaft 32 (2) 40–42 (1979) [2 ref. De, en, fr] [Lehrstuhl für Allgemeine Lebensmitteltech., Tech. Univ. München, 8050 Freising-Weihenstephan, Federal Republic of Germany]

Studies were conducted to evaluate effects of cellulose source and level in cellulose/asbestos filter sheets on adsorption of aflatoxin B_1 from a model solution containing 5 µg aflatoxin B_1/l. 4 cellulose sources were studied: (i) a softwood cellulose, non-ground; (ii) as (i), but ground; (iii) a second softwood cellulose; and (iv) linters. Trials were conducted with filter sheets containing 20, 40, 60 or 80% cellulose. A table of data is given, showing the concn. and % of aflatoxin adsorbed on the filter sheet. Mean % aflatoxin adsorption values for (i)-(iv) were: 2% asbestos filter sheet 34, 42, 36 and 31; 40% asbestos filter sheet 55, 81, 49 and 85; 60% asbestos filter sheet 91, 96, 72 and 96; and 80% asbestos filter sheet 100, 100, 98 and 100. It is concluded that, at some asbestos/cellulose ratios, the type and particle size of the cellulose may influence the aflatoxin-adsorption characteristics of the filter sheet, although cellulose itself has a very low aflatoxin adsorption capacity. AJDW

107

[Mycotoxins and fruits.] [Review]
Dupaigne, P.
Fruits 33 (7/8) 505–519 (1978) [178 ref. Fr] [IRFA, BP 5035, 34032 Montpellier Cedex, France]

This article reviews the published work on mycotoxins in fruit, with special sections devoted to aflatoxins and patulin. The main mycotoxins, their fungal origin and toxic effects are tabulated. A survey of the occurrence of patulin on fruit and fruit products revealed no health hazard, as the amounts likely to be consumed are negligible. RM

108

Minicolumn detection method applied to almonds: collaborative study.
Stanley, G. I., Jr.; DiProssimo, V. P.; Koontz, A. C.
Journal of the Association of Official Analytical Chemists 62 (1) 136–140 (1979) [6 ref. En] [Dried Fruit Ass. of California, 1855 S Van Ness Avenue, PO Box 86, Fresno, California 93707, USA]

Minicolumn screening method for aflatoxins was collaboratively tested on naturally contaminated almonds. Nuts were extracted, and the extract was cleaned up and applied to a Velasco-type minicolumn. This permits the detection of total aflatoxins (B_1, B_2, G_1, G_2) as a fluorescent band on the Florisil layer of the column. Results of 20 collaborators are presented. Samples containing 0, 2, 5, 10 and 25 ng aflatoxin/g were analysed. 96% of the samples containing 5–25 ng total aflatoxins/g and 83% of the negative samples were correctly identified. The method has been adopted as official 1st action for detection of total aflatoxin levels of $\geq$5 ng/g.   AS

109

[Contamination of spices and its effects in the food industry.]
Moreau, C.; Moreau, M.
Alimentation et la Vie 66 (3) 174–182 (1978) [19 ref. Fr]

See FSTA (1979) 11 1T39.

110

Spectrodensitometric determination of trichothecene mycotoxins with 4-(p-nitrobenzyl)pyridine on silica gel thin-layer chromatograms.
Takitani, S.; Asabe, Y.; Kato, T.; Suzuki, M.; Ueno, Y.
Journal of Chromatography 172, 335–342 (1979) [15 ref. En] [Fac. of Pharmaceutical Sci., Sci. Univ. of Tokyo, Shinjuku-ku, Tokyo 162, Japan]

A simple method for detection and spectrodensitometric detn. of a numer of trichothecene mycotoxins on silica gel layers based on a colour reaction between 4-(p-nitrobenzyl)pyridine and the 12,13-epoxy group in the trichothecene nucleus is described. Detection limits for the 12 trichothecenes examined were 0.025-0.2 µg/spot. 6 of the 12 trichothecenes could also be determined spectrodensitometrically in the range from about 0.05-0.2 to 10 µg/spot with a coeff. of variation of about 5%. Direct application of the method to trichothecenes in agricultural samples was unsuccessful because of interfering substances and further studies of clean-up procedures are required. The clean-up procedure of Naoi et al. [see FSTA (1976) 8 9C444] effectively recovered fusarenon-X added to a sample of polished rice, but not added T-2 toxin.   AL

111

The analysis of aflatoxins by high-performance liquid chromatography.
Colley, P. J.; Neal, G. E.
Analytical Biochemistry 93 (2) 409–418 (1979) [13 ref. En] [MRC Toxicology Unit, Med. Res. Council Lab., Woodmansterne Road, Carshalton, Surrey SM5 4EF, UK]

The potential of high-performance liquid chromatography as a technique for separating aflatoxins B_1, B_2, G_1, G_2, B_{2a}, Q_1, M_1, P_1, aflatoxicol, and a degradation product of aflatoxin B_1, 2,3-dihydrodiol, was assessed. A microparticulate silica adsorption column used with a 1:1 chloroform/dichloromethane eluant provided good resolution of aflatoxins B_1, B_2, G_1, and G_2 but the addition of 1% propan-2-ol was necessary for the elution of aflatoxins M_1 and Q_1. By selecting appropriate solvent mixtures, good resolution of all of the aflatoxins studied was obtained using columns containing an octadecyl (C18) reversed-phase bonded to a microparticulate support. Details are given for resolving aflatoxins B_1, B_2, G_1, and G_2 using a 50% tetrahydrofuran–15% dimethylformamide in water eluant, and aflatoxins B_1, B_{2a}, Q_1, M_1, P_1, aflatoxicol, and a product of aflatoxin B_1, 2,3-dihydrodiol treated with Tris-buffer, using either 15% dimethylformamide in water or 10% tetrahydrofuran in water as eluant.   AS

112

Determination of aflatoxins in some stored grains.
Iqbal, A.; Qureshi, A. R.; Qureshi, M. J.; Nasir, M. A.; Yaqub, M.
Pakistan Journal of Scientific Research 28, 50–58 (1976) [11 ref. En] [Dep. of Biochem., Univ. of Agric., Faisalabad, Pakistan]

16 seed-borne isolates from stored grains suspected of producing aflatoxins were screened for analysis. Qualitative silica gel TLC was used to detect aflatoxins B_1, B_2, G_1 and G_2 in 13, 8, 14 and 8 mould species (Aspergillus and Penicilium) resp. Of the isolates, A. nidulans, A. wentii, A. candidus, A. niger and A. parasiticus produced all 4 toxins, another 9 species produced 2–3 toxins and 2 species 1 toxin. Quantitative analysis of 5 corn feed samples showed aflatoxin B levels of 12.14–13.07 parts/billion, and aflatoxin G levels of 9.10–9.80 parts/billion.   RM

113

[Update on mycotoxin analysis.] [Conference proceedings]
Italy, Associazione Italiana Analisti Chimici
Tecnica Molitoria 30 (2) 105–127 (1979) [many ref. It]

Papers are published that were presented at a meeting held at Bologna, Italy, 24–25 Nov. 1978, including some introductory remarks by G. Martini (pp 105–106); and Basic principles of mycology and mycotoxicology, by G. Cirilli (pp 107–109). A further 5 papers are abstracted individually and are listed in the FSTA author index under **Italy, Associazione Italiana Analisti Chimici** [Mycotoxin Symposium].   DIH

114

Significance of mycotoxins to food safety and human health. [Review]
Bullerman, L. B.
Journal of Food Protection 42 (1) 65–86 (1979) [189 ref. En] [Dep. of Food Sci. & Tech., Univ. of Nebraska, Lincoln, Nebraska 68583, USA]

The significance of mycotoxins in food safety is considered under the headings of Mycotoxins, including aflatoxins, sterigmatocystin, ochratoxins, patulin, penicillic acid, zearalenone and T-2 toxin (chemical, physical and toxicological properties are tabulated); Relation to human health, including acute toxicity, carcinogenicity and chronic toxicity, and effect of diet and nutrition; Implications to food safety, including nuts and oilseeds, grains, fruits and vegetables, animal products; refrigerated foods, stability of mycotoxins in foods, regulation and control mycotoxins; and Conclusions. DIH

115

Mycotoxins in foodstuffs. [Conference proceedings]
International Union of Pure & Applied Chemistry
Archives de l'Institut Pasteur de Tunis 54 (3/4) 230–535 (1977) [many ref. En, Fr]

The full text is given of papers on analysis, control and detoxification of mycotoxins, presented at this symposium held in Paris, France, on 16–18 Sept. 1976, including the following: Identification of mycotoxins by species of Fusarium and Stachybotrys obtained from East Europe, by C. Szathmary, C. J. Mirocha & M. Palyusik (pp. 347–354, 8 ref., En, fr); Control of mycotoxins and moulds in Sweden, by G. Nilsson (pp. 391–393, 1 ref., En); Genetically determined structural parameters of the seed coat affecting the colonization of peanut seeds by aflatoxin producing aspergilli, by M. C. Dieckert & J. W. Dieckert (pp. 441–459, 17 ref., En, fr); and Reduction of mycotoxin contamination in peanuts through resistant variety development, by R. E. Pettit, R. A. Taber, O. D. Smith & B. L. Jones (pp. 501–510, 9 ref., En). A further 21 papers are abstracted separately in FSTA, and are listed in the author index under International Union of Pure & Applied Chemistry [Mycotoxins Symposium]. [See also FSTA (1978) 10 9C297 for further sections of this symposium.] AJDW

116

[Mycotoxicological analysis of foods.]
Fremy, J.-M.; Corbion, B.
Annales des Falsifications et de l'Expertise Chimique 72 (772) 53–64 (1979) [16 ref. Fr, en] [Min. de l'Agric., Services Vet. Lab. Cent. d'Hygiene Alimentaire, 43 Rue de Dantzig 75015, Paris, France]

A brief review is given of methods for detection and detn. of mycotoxins, chiefly in animal feed, but also in food, for the following: aflatoxin B_1, aflatoxin M_1, zearalenone, patulin, ochratoxin A and sterigmatocystin. Limits of detection of the referenced methods are tabulated. DIH

117

[Mycotoxins.] [Review]
Kravchenko, L. V.; Tutel'yan, V. A.
Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva im. D. I. Mendeleeva 23 (4) 390–404 (1978) [198 ref. Ru] [Inst. Pitaniya AMN SSSR, USSR]

Data on mycotoxins, the highly toxic metabolites of some moulds which attack foods and fodder, are reviewed. Problems related to propagation of mycotoxins in nature, their toxic and carcinogenic properties and the mechanism of their action are discussed. Special attention is given to the aflatoxins group, which have marked hepatotoxic and hepatocarcinogenic properties, ochratoxins, citrinin, patulin, trichothecenes, sporofurazariogenin and several other mycotoxins associated with food-borne mycotoxicosis. STI

118

Preliminary report on toxigenic fungal isolates of Aspergillus niger in market foods and foodstuffs.
Glinsukon, T.; Romruen, K.; Visutasunthorn, C.
Experientia 35 (4) 522–523 (1979) [14 ref. En] [Dep. of Physiol., Fac. of Sci., Mahidol Univ., Bangkok, Thailand]

22 isolates of Aspergillus niger were obtained from market foods in Bangkok. The isolates were grown on mouldy rice, and the toxicity of extracts from the cultures to weanling rats was studied. 14 of the 22 isolates were moderately to highly toxic (food sources included rice, mung bean, corn, roast peanut and soybean). Results suggested that most of the effects were due to nephrotoxins. 2 of the cultures produced small amounts of aflatoxin B_1 (12 and 34 μg/kg mouldy rice). DIH

119

Induction of duodenal serotonin production by dietary sodium selenite and aflatoxin B_1.
Lalor, J. H.; Kimbrough, T. D.; Llewellyn, G. C.
Food and Cosmetics Toxicology 16 (6) 611–613 (1978) [21 ref. En] [Dep. of Biol., Virginia Commonwealth Univ., Richmond, Virginia 23284, USA]

Investigations carried out with Mongolian gerbils fed diets supplemented with 5 p.p.m. sodium selenite, 12.8 p.p.m. aflatoxin B_1, or both, show that aflatoxin B_1 and sodium selenite influence serotonin metabolism both separately and in combination. VJG

120

Hydrazines as mutagens in a histidine-requiring auxotroph of Salmonella typhimurium.
Tosk, J.; Schmeltz, I.; Hoffmann, D.
Mutation Research 66 (3) 247–252 (1979) [13 ref. En] [American Health Foundation, Naylor Dana Inst. for Disease Prevention, Valhalla, New York 10595, USA]

Hydrazines have been found naturally in tobacco and mushrooms. Other hydrazines are used in industry, medicine and agriculture. Although about 38 hydrazines are carcinogenic, few, if any, have been tested successfully in rapid bacterial mutagenesis assays. A tester strain of Salmonella typhimurium (TA1530) was used to determine the mutagenic activity of a number of hydrazines and related compounds. This strain was shown to be effective as a tester organism for easy detection of hydrazines as mutagens. AS

121

Moulds, toxins and food. [Book]
Moreau, C.; Moss, M.
x + 477pp. ISBN 0-471-99681-5 (1979) [many ref. En]
Chichester, W. Sussex, UK; John Wiley & Sons Ltd.
Price £21.00

This En translation of the original Fr edition of this textbook [see FSTA (1977) 9 2C80] includes the following sections: Food-borne moulds (pp. 3–26);

Mycotoxicoses and mycotoxins (pp. 27–62); Aflatoxicosis (pp. 63–143); Clavacitoxicosis (pp. 144–157); Other aspergillotoxicoses (pp. 158–189); Islanditoxicosis (pp. 190–196); Diverse Penicillium toxicoses (pp. 197–216); Fusariotoxicoses (pp. 217–236); Sporidesmiotoxicosis (pp. 237–244); Stachybotryotoxicosis (pp. 245–251); Other mycotoxicoses (pp. 252–272); Perspectives of the struggle (pp. 273–285); and Recent developments in the study of mycotoxins (pp. 286–319). An extensive bibliography (pp. 320–458) is given, together with a 7-pp. taxonomic index and an 11-pp. subject index. AJDW

122

[Importance and analysis of mycotoxins other than aflatoxin.] Bedeutung und Analytik von Mykotoxinen ausser Aflatoxin.
Müller, H.-M.
Landwirtschaftliche Forschung Sonderheft 33/I, 282–297 (1977) [124 ref. De, en, fr] [Univ. Hohenheim, Postfach 106, D-7000 Stuttgart 70, Federal Republic of Germany]

The chemical structure, biological properties, natural occurrence, fungal origin and methods for detn. of the following mycotoxins are described: zearalenone, 12,13-epoxytrichothecenes (T-2 toxin, diacetoxyscirpenol), ochratoxin A, citrinin, sterigmatocystin and penicillic acid. AS

123

[Chemical and biological aspects of mycotoxins.] [Lecture]
Battaglia, A.
Tecnica Molitoria 30 (2) 110–114 (1979) [It]

Brief discussions are given of aflatoxins, sterigmatocystin, ochratoxin, zearalenone, trichothecenes, tremorgens and patulin; aspects considered include structure, toxicity, stability, UV-fluorescence characteristics, microorganisms forming these toxins, and foods in which they occur. [See FSTA (1979) 11 9C476.] AJDW

124

[Biochemistry of aflatoxins.] [Lecture]
Bonora, S.
Tecnica Molitoria 30 (2) 114–118 (1979) [11 ref. It] [Lab. di Chimica Analytica Applicata, Bologna, Italy]

Aspects discussed, with reference to literature data, include: structure; mechanisms of toxicity and carcinogenicity; and metabolism and elimination of aflatoxins in mammals (including man). [See FSTA (1979) 11 9C476.] AJDW

125

[Method for determination of mycotoxins.] [Lecture]
Cirilli, G.; Cantafora, A.; Bonora, S.; Angeli, A. degli
Tecnica Molitoria 30 (2) 125–126 (1979) [It]

A 50 g sample of the food under test is mixed with 10 g Celite, and extracted with acetone/water (80:20); the acetone is eliminated from the extract by evaporation, and the aqueous residue is defatted with hexane or isooctane in a separating funnel. The aqueous phase is then extracted 3 × with chloroform. The chloroform extract is concentrated to 50 ml, mixed with 60 ml hexane, and separated by column chromatography on silica gel, aflatoxins and trichothecenes being eluted with methanol/chloroform (7:93), ochratoxins and patulin being eluted with benzene/acetic acid (90:10), or all mycotoxins being eluted with toluene/acetic acid/formic acid (50:40:10). The eluates are evaporated to dryness, and the residues dissolved in chloroform. The mycotoxins are then separated by TLC on silica gel, using a toluene/acetic acid/formic acid (60:32:8) solvent system. Mycotoxins may be identified and determined by UV fluorescence measurement. [See FSTA (1979) 11 9C476.] AJDW

126

[Practical standards for preparation and checking of standard aflatoxin solutions.] [Lecture]
Cantafora, A.; Cirilli, G.
Tecnica Molitoria 30 (2) 126–127 (1979) [It]

Preparation of standard aflatoxin solutions, for use in food analyses, etc., is described, with reference to: safety precautions; practical aspects of preparation of standard solutions in benzene/acetonitrile (98:2); calculation of the actual aflatoxin concn. in the standard solution on the basis of optical density measurements at 350 nm; and evaluation of the purity of the sample by TLC and/or spectrophotometry. [See FSTA (1979) 11 9C476.] AJDW

127

The direct thin layer chromatographic densitometric identification of eight mycotoxins. [Lecture]
Reimerdes, E. H.
Archives de l'Institut Pasteur de Tunis 54 (3/4) 335–345 (1977) [14 ref. En, fr] [Inst. für Chem., Bundesanstalt für Milchforschung, D-2300 Kiel, Federal Republic of Germany]

A TLC procedure for separation and identification of the mycotoxins (i) citrinin, (ii) patulin, (iii) penicillic acid, (iv) aflatoxin B_1, (v) aflatoxin B_2, (vi) sterigmatocystin, (vii) ochratoxin and (viii) citreoviridin is described. The mycotoxins are separated on plates coated with Schleicher & Schüll G 1500 silica gel and developed with the following solvent systems: (iv) and (v), chloroform/acetone/n-hexane (85:15:20); (i), (ii), (vi) and (vii), toluene/ethyl acetate/90% formic acid (10:3:1); (iii) toluene/ethyl acetate/90% formic acid (6:3:1); and (viii) acetone/n-hexane (1:1). A mixture of (i), (iii) and (vii) could be separated using benzene/methanol/acetic acid (24:2:1). The mycotoxin flecks are identified by direct spectral densitometry on the TLC plates. UV/visible spectra of (i)-(viii) are presented. The method is applicable to relatively impure extracts. Good results were achieved; identification of mycotoxins at levels in the ng range is possible. [See FSTA (1979) 11 9C478).] AJDW

128

[The problem of artifacts in the determination of aflatoxins.] [Lecture]
Siriwardana, M. G.
Archives de l'Institut Pasteur de Tunis 54 (3/4) 405–409 (1977) [13 ref. Fr, en] [INSERM, 44 Rue du Chemin de Ronde, 78110, Le Vesinet, France]

Blue fluorescent artefacts may occur during TLC analysis for aflatoxins, especially in foods processed with sugars. Tests were conducted to determine whether these artefacts were attributable to sugar degradation products. 20% aqueous solutions of sucrose, glucose, mannose or sorbose were mixed with HCl to give final HCl concn. of 0.2–0.5M, held at room temp. or heated at 67° or 85°C for 30 min, and then analysed by TLC using various solvent systems. The results show that sugar solutions treated with HCl at concn. 0.2–1M and heated gave blue or green fluorescent flecks with similar R_f values to aflatoxins; they also gave positive results in confirmatory tests by spraying with 25% H_2SO_4 or trifluoroacetic acid. It is concluded that existence of these artefacts casts doubt upon some positive results for aflatoxins in sugar-containing foods. [See FSTA (1979) **11** 9C478.] AJDW

129

Review of prevention, elimination, and detoxification of aflatoxins. [Lecture]
Goldblatt, L. A.; Dollear, F. G.
Archives de l'Institut Pasteur de Tunis 54 (3/4) 411–422 (1977) [35 ref. En] [S. Regional Res. Cent., USDA, PO Box 19687, New Orleans, Louisiana 70179, USA]

Aspects considered in this review include: control of aflatoxins in food crops by agricultural practices; factors influencing invasion of groundnuts by Aspergillus flavus; screening of commodities for aflatoxins, to permit withdrawal of contaminated batches from food use; the potential for use of antifungal agents for control of growth of toxigenic fungi; breeding of crops resistant to invasion by Aspergillus flavus; separation of aflatoxin-containing from non-contaminated kernels or seeds; solvent-extraction of aflatoxins; destruction of aflatoxins during heat treatment of nuts, etc.; microbial inactivation of aflatoxins; and procedures for chemical detoxification of aflatoxin-containing products. [See FSTA (1979) 11 9C478.] AJDW

130

Suggestions on prevention of aflatoxin formation in pistachio nuts. [Lecture]
Denizel, T.
Archives de l'Institut Pasteur de Tunis 54 (3/4) 433–440 (1977) [25 ref. En] [Dep. of Agric. Microbiol., Univ., Reading, Berks., UK]

Studies on contamination of pistachio nuts with Aspergillus flavus and aflatoxins were conducted at harvest and during drying and processing. The results show that nuts were generally not contaminated with Asp. flavus unless the shell was split; contamination with Asp. flavus started when the nuts were on the trees. In storage, presence of hulls on nuts speeded mould proliferation. Aflatoxin was detected after 48 h in nuts with split shells, vs. 10 days for non-split nuts. Presence of the hull on non-split nuts reduced the period before aflatoxin detn. to 6 days under the same storage conditions. Current pistachio nut storage and handling procedures are critically discussed.
A procedure is recommended based on rapid drying to ≤7.5% moisture after hull removal, separation and early marketing of split nuts, and fumigation, etc. of dehulled nuts to minimize insect damage. Centralization of storage is also recommended. [See FSTA (1979) **11** 9C478.] AJDW

131

Occurrence and prevention of mycotoxins in pecans. [Lecture]
Schroeder, H. W.
Archives de l'Institut Pasteur de Tunis 54 (3/4) 479–485 (1977) [4 ref. En, fr] [USDA, PO Box ED, College Station, Texas 77840, USA]

Contamination of pecans with toxigenic fungi and mycotoxins is discussed, on the basis of literature and experimental data. No mycotoxins were detected in pecans from orchards of the Agricultural Research Service or the Texas Agricultural Experiment Station. Aflatoxins were detected at a level of 36 parts/billion (p.p.b.) in a single sample of pecans from a retail outlet. Studies on pecan 'pickouts' (damaged and discoloured kernels) from commercial shellers showed aflatoxin concn. ≤50 p.p.b.; the average concn. was, however, only 5 p.p.b. Other mycotoxins (alternariol, alternariol monomethyl ether, sterigmatocystin, and zearalenone) were also detected in pecans. Both Aspergillus flavus and Asp. parasiticus were capable of invasion of, and aflatoxin formation in, undamaged pecans; cracked pecans or thin-shelled pecan var. were more susceptible to mould invasion and aflatoxin formation than sound nuts of thick-shelled var. Nuts which had lain on the ground for ≥1 wk had a high incidence of mould contamination. Mechanical harvesting may cause a relatively high incidence of cracking of the shells; efficient cleaning, drying and storage are therefore essential if mould growth is to be avoided. [See FSTA (1979) **11** 9C478.] AJDW

132

Variations in aflatoxin production due to fungal isolates and crop genotypes and their scope in prevention of aflatoxin production. [Lecture]
Tulpule, P. G.; Bhat, R. V.; Nagarajan, V.; Priyadarshini, E.
Archives de l'Institut Pasteur de Tunis 54 (3/4) 487–493 (1977) [17 ref. En] [Nat. Inst. of Nutr., Indian Council of Med. Res., Jamai Osmania, Hyderabad-500007, India]

Studies on the resistance of crop var. to infection and aflatoxin formation by several isolates of Aspergillus flavus and Asp. parasiticus are described; trials were conducted on 78 groundnut var., 38 maize var., 5 soybean var., a nd 5 sunflower seed var. Ranges of values for aflatoxin concn. formed were (p.p.m.): groundnuts, traces-237; maize, traces-270; soybeans, 0.1–31; and sunflower seed, traces-16. 3 groundnut var. supporting formation only of very low aflatoxin concn. (≤1 p.p.m.) were identified, as were 5 maize var. supporting formation only of aflatoxin concn. ≤4 p.p.m. Studies on the resistance of these var. grown under various agro-ecological conditions are briefly described. [See FSTA (1979) 11 9C478.] AJDW

133

[Industrial process for treatment of aflatoxin-contaminated groundnut presscake.] [Lecture]
Lesieur, B.
Archives de l'Institut Pasteur de Tunis 54 (3/4) 521–

526 (1977) [Fr]

An industrial-scale process for detoxification of aflatoxin-contaminated groundnut presscake, etc. is described, based on adjustment of the product to a moisture content ≥8%, and treatment with NH_3 gas at a pressure of 0.5-2 bar at ≥80°C for 15-30 min. Equipment required is discussed, with reference to problems with moistening of the presscake, sealing the apparatus against NH_3 leaks, recovery of excess NH_3, and elimination of NH_3 residues from the product; the relative merits of continuous and semi-continuous installations are discussed, together with capital and operating costs, and control of environmental pollution. [See FSTA (1979) 11 9C478.] AJDW

134

The detoxification of oil-seed cakes polluted by aflatoxins, research and development of an industrial process. [Lecture]

Giddey, C.; Brandt, J.; Bunter, G.

Archives de l'Institut Pasteur de Tunis 54 (3/4) 527-535 (1977) [4 ref. En] [Food Res. Cent., Battelle Geneva 7, Route de Drize, 1227 Carouge, Geneva, Switzerland]

A procedure for detoxification of aflatoxin-contaminated groundnut presscake or similar materials is described, based on treatment with $Ca(OH)_2$ slurry and monomethylamine solution at a level of 2% $Ca(OH)_2$ and 0.5% monomethylamine relative to presscake wt. The mixture may be heated at 80-95°C for 30-60 min at atm pressure in a sealed vessel, or heated at 100-110°C for 1-5 min in a heated screw-press extruder. The treated products are then heated in a drier to eliminate excess moisture and monomethylamine. Practical trials showed that aflatoxin concn. could be reduced from 2000 parts/billion to ≤50 parts/billion by this method. Residual monomethylamine concn. in the detoxified product was 200-300 p.p.m. Nutritional value of the groundnut presscake was slightly reduced by the detoxification treatment. [See FSTA (1979) 11 9C478.] AJDW

135

[Sampling for determination of aflatoxin in peanuts and other nuts mentioned in the aflatoxin decree, from cases and prepared packs.] Zur Probenahme für die Ermittlung des Aflatoxingehaltes bei Erdnuss- und anderen in der Aflatoxin-VO [16] genannten Samenkernen aus Gebinden und Fertigpackungen.

Hanssen, E.; Waibel, J.

Alimenta 17 (5) 139-143 (1978) [19 ref. De, en] [H. Bahlsens Keksfabrik KG, D-3000 Hannover, Federal Republic of Germany]

The frequency of aflatoxin contamination in some nuts is discussed, i.e. groundnuts 1 in 4000 (as lifted), reduced to 1 in 10 000 after first sorting, 1 in 33 000 after second sorting (manual or electronic); hazelnuts 1 in 30 000; almonds 1 in 26 000-45 000; and walnuts 1 in 29 000. As these nuts cannot be harvested without some contamination, the Swiss Health Act accepts contamination of 1 in 10 000 as standard. The following control method was devised: samples of 2.5 kg, as 10 sub-samples of 250 g, with max. per sub-sample of ≤25 µg aflatoxin B_1, ≤125 µg $B_2 + G_1 + G_2$. Sample size of 2.5 kg (5000-8000 peanut kernels) gives a 50% probability of detecting contaminated kernels and divides the chance of detection equally between the processors and health authorities. Analysis of single packages is worthless. RM

136

Application of high performance liquid chromatography to the analysis of aflatoxin B_1 in groundnut meals. [Lecture]

Kmieciak, S.

Archives de l'Institut Pasteur de Tunis 54 (3/4) 289-303 (1977) [8 ref. En, fr] [Cent. Chem. Lab., Indyjska 13, 81-336 Gdynia, Poland]

20 g groundnut meal are extracted with 10 ml water + 100 ml chloroform for 30 min; after filtration and concn. by evaporation, the extract is then purified on a silica gel column (elution successively with 150 ml n-hexane, 150 ml diethyl ether and 150 ml of 3% methanol in chloroform). The methanol/chloroform eluate is collected, evaporated to dryness, re-dissolved in chloroform, re-evaporated to dryness, dissolved in n-hexane/chloroform/ethanol (50.0:49.5:0.5) and analysed by high-performance liquid chromatography on a 50 × 0.2 cm Corasil II column, pressure 15-30 atm, flow rate 1-2 ml/min. A UV absorption detector is used. Detection limit is approx. 30 µg/kg; detector response is linear over the range 100-2500 ng aflatoxin. Recovery was 95.2-118.0% (average 105.4%). Results determined by this method agreed well with TLC analyses. [See FSTA (1979) 11 9C478.] AJDW

137

Apparatus for rapid inspection of corn for aflatoxin contamination.

Barabolak, R.; Colburn, C. R.; Just, D. E.; Kurtz, F. A.; Schleichert, E. A.

Cereal Chemistry 55 (6) 1065-1067 (1978) [9 ref. En] [Moffett Tech. Cent., CPC Int. Inc., PO Box 345, Argo, Illinois 60501, USA]

A simple device for rapid inspection of corn for aflatoxins on the basis of UV fluorescence is described; corn is fed through a funnel onto a vibrating feeder, the funnel being adjustable so that a monolayer of corn moves across the feeder tray. The corn is inspected, through a viewing port, for fluorescence under UV light at 365 nm. The apparatus is enclosed in a light-tight cover to avoid interference of external light sources with detection of fluorescence. This apparatus permits examination of 10 lb corn in <10 min. The count of blue-green fluorescent kernels is not a direct measure of aflatoxin content. However, it was observed that if the count was <18 fluorescent kernels/10 lb, <2% of batches containded >20 parts/billion aflatoxin; if the count was >18 fluorescent kernels/10 lb. 1 in 3 batches contained >20 parts/billion aflatoxin. Possible other applications of similar apparatus are considered, e.g. inspection of granular sugar for discoloured or foreign particles. AJDW

138

Analytical problems and method modifications in mycotoxin determination in cereals and feeds. [Lecture]

Piskorska-Pliszczynska, J.; Juszkiewicz, T.
Archives de l'Institut Pasteur de Tunis 54 (3/4) 279-288 (1977) [10 ref. En] [Dep. of Pharmacology & Toxicology, Vet. Res. Inst., 24-100 Pulawy, Poland]

A procedure for detn. of mycotoxins in cereals is described, based on extraction with acetonitrile/4% aqueous KCl solution (9:1), purification of the extract by partition against isooctane, re-extraction of mycotoxins from the acetonitrile phase into chloroform, evaporation of the chloroform extract to dryness, dissolving the residue in benzene/acetonitrile, and TLC analysis on silica gel H plates. For detn. of aflatoxins, the chromatograms are developed with chloroform/trichlorethylene/amyl alcohol/formic acid (80:15:4:1); for detn. of ochratoxins, sterigmatocystin and zearalenone, the chromatograms are developed with toluene/ethyl acetate/formic acid (60:30:10). Flecks may be tentatively evaluated under UV light; methods for chemical confirmation are specified. Quantitative detn. may be performed by densitometry on the developed plates. Detection limits were: aflatoxins 5 µg/kg, ochratoxins 100 µg/kg, sterigmatocystin 50 µg/kg and zearalenone 400-500 µg/kg. [See FSTA (1979) 11 9C478.] AJDW

139

[Application of high performance liquid chromatography to determination of aflatoxins and other mycotoxins in oilseed presscakes and derived products.] [Lecture]
Blanc, M.; Midler, O.; Karleskind, A.
Archives de l'Institut Pasteur de Tunis 54 (3/4) 305-324 (1977) [14 ref. Fr] [Lab. Wolff, 198 Rue Sigmund Freud, 75019, Paris, France]

A procedure is described for detn. of mycotoxins in oilseed presscake etc. Chloroform extracts are analysed, without further purification, by high-performance liquid chromatography on a 15 cm Lichrosorb Si 60 column using an isooctane/isopropyl ether/methylene chloride/ethyl acetate/acetonitrile (35:40:15:5:5) mobile phase, with UV spectrophotometric detection. Detector response is linear over a wide range of mycotoxin concn., e.g. 1-1000 ng aflatoxin B_1. Repeatability is good. Detection limit is 1 ng for aflatoxin B_1. Practical application of this technique to analysis of oilseed presscakes etc. is described. [See FSTA (1979) 11 9C478.] AJDW

140

The use of high pressure liquid chromatography for determination of aflatoxins in olive oil. [Lecture]
Toussaint, G.; Lafaverges, F.; Walker, E. A.
Archives de l'Institut Pasteur de Tunis 54 (3/4) 324-334 (1977) [12 ref. En] [Int. Agency for Res. on Cancer, 150 Cours Albert-Thomas, 69008 Lyon, France]

Aflatoxins are extracted from an olive oil/petroleum ether mixture into methanol/water (100:50) containing 4% KCl. The extract is then washed with hexane, and treated with lead acetate + Celite to remove pigments. Aflatoxins are then re-extracted into chloroform. This extract is then dried with Na_2SO_4, evaporated to dryness, re-dissolved in chloroform, and subjected to clean-up by semipreparative high-pressure liquid chromatography (HPLC) on Partisil, using dichloromethane containing 2% methanol, at 40 bar pressure. The collected fraction of the eluate is evaporated to dryness, redissolved in benzene/acetonitrile (98:2) and analysed by HPLC on a Partisil column (elution with dichloromethane containing 1% methanol) at 120 bar pressure. Good separation of aflatoxins B_1, G_1, B_2 and G_2 was achieved; aflatoxin recovery is approx. 80%; reproducibility is >10%. Aflatoxins could be detected at concn. as low as 1 µg/kg. Comparison of results determined by HPLC with those determined by TLC showed HPLC to be more rapid and more sensitive. [See FSTA (1979) 11 9C478.] AJDW

141

The effect of processing on the aflatoxin M_1 content of milk and milk products. [Lecture]
Egmond, H. P. van; Paulsch, W. E.; Veringa, H. A.; Schuller, P. L.
Archives de l'Institut Pasteur de Tunis 54 (3/4) 381-390 (1977) [24 ref. En, fr] [Nat. Inst. of Public Health, PO Box 1, Bilthoven, Netherlands]

Raw milk containing aflatoxin M_1 at 1.52-1.72 µg/kg was obtained from cows fed aflatoxin B_1. The milk was pasteurized or sterilized, and cheese and yoghurt were prepared. 3 different cultures for yoghurt preparation and 3 different starters for cheesemaking were used. No loss of aflatoxin M_1 was observed in heat-treated milk. The content of aflatoxin M_1 in yoghurt was slightly higher than in milk and no difference was observed with regard to the various cultures used. Cheese whey showed a significantly lower content of M_1 compared with milk (about 1 µg/kg). The aflatoxin M_1 content of Gouda cheese was about 7-8 µg/kg and did not differ significantly with different starters or during 6 months ripening. [See FSTA (1979) 11 9C478.] JMD

142

A column detection method for aflatoxin M_1 in milk and urine. [Lecture]
Messripour, M.; Nesheim, S.
Archives de l'Institut Pasteur de Tunis 54 (3/4) 363-371 (1977) [14 ref. En, fr] [Univ. of Isfahan, Isfahan, Iran]

50 ml milk are blended with acetone and filtered, and the filtrate is treated with lead acetate solution. Lipids are extracted with hexane and the aflatoxin is extracted from the aqueous acetone phase with chloroform, purified and finally passed through a minicolumn packed with layers of Florisil, silica gel, acidic alumina, and a mixture of charcoal/magnesia/Celite; the aflatoxin is detected as a blue fluorescent band at the top of the Florisil, which is at the bottom of the column. Aflatoxin M_1 is confirmed by 2-dimensional TLC using chloroform/acetone/isopropanol, first at 85:10:5 and then at 85:10:7. The method could detect aflatoxin M_1 added at 0.05 µg/kg to milk, yoghurt, cheese or dried milk. [See FSTA (1979) 11 9C478.] JMD

143

Prevention of toxin mold growth in cheese by pimaricin. [Lecture]
Shahani, K. M.; Bullerman, L. B.; Evans, T. A.; Arnold, R. G.

Archives de l'Institut Pasteur de Tunis 54 (3/4) 511–520 (1977) [10 ref. En]

Studies were made of the inhibitory effect of pimaricin upon Aspergillus parasiticus, capable of producing aflatoxin, and Penicillium patulum, capable of producing patulin, in Cottage, Cheddar and Parmesan cheese. Pimaricin added at 0.5–5.0 p.p.m. to Cottage cheese delayed the sporulation of the 2 moulds and inhibited their growth rate. With Cheddar cheese, dipping the cheese blocks in 1000 or 2000 p.p.m. pimaricin suspension retarded the mould growth. Adding 500–1000 p.p.m. pimaricin in the plastics coat applied to Parmesan cheese provided added inhibitory effect upon the mould on the cheese. The moulds produced no detectable toxins. [See FSTA (1979) 11 9C478.] JMD

144

[Determination of aflatoxins by high pressure liquid chromatography (HPLC).] Zur Bestimmung von Aflatoxinen mittels Hochdruckflüssigkeitschromatographie.

Siegfried, R.; Rückemann, H.

Chemiker-Zeitung 102 (11) 403–404 (1978) [2 ref. De] [Staatliche Landwirtschaftliche Untersuchungs- & Forschungsanstalt, Augustenberg 1, Karlsruhe-, Durhach, Federal Republic of Germany]

The HPLC aflatoxin detn. method [see FSTA (1977) 9 9C390] was modified by replacing the coil of the fluorescence detector with a transparent, straight teflon tube filled with silicia gel. Limits of detection were unchanged at 0.05 ng for aflatoxin G_2, 0.2 for G_1, 0.3 for B_2, 0.4 for B_1 and 1.0 for M_1. RM

145

Semiquantitative estimation of the mycotoxins citrinin, ochratoxin A, aflatoxin M, and penicillic acid on thin-layer chromatograms with a grey scale.

Reiss, J.

Zeitschrift für Analytische Chemie 293 (2) 138–140 (1978) [6 ref. En, de] [Mikrobiol. Lab. der Grahamhaus Studt KG, D-6550 Bad Kreuznach, Federal Republic of Germany]

The semiquantitative method previously developed for detn. of aflatoxins B, and G, [FSTA (1974) 6 2C50] and for sterigmatocystin [see preceding abstr.] in bread and bakery goods was adapted for detn. of citrinin, ochratoxin A, aflatoxin M, and penicillic acid. Silica gel chromatograms of the mycotoxins, visualized at 365 nm, were estimated using a Kodak grey scale commonly used in photographic laboratories. Limits of detection were 0.01, 0.006, 0.002 and 0.01 μg, resp. Standard curves for disappearance of fluorescence are reproduced for the 4 mycotoxins. RM

146

[Determination and hygienic-toxicological significance of patulin in fruit and fruit products.] Zur Analytik und lebensmittelhygienisch-toxikologischen Bedeutung von Patulin in Obst und Obstprodukten.

Fritz, W.; Buthig, C.; Engst, R.

Nahrung 23 (2) 159–161 (1979) [41 ref. De, en, ru] [Zentralinst. für Ernährung, Potsdam-Rehbrücke, German Democratic Republic]

The combination of extraction, chromatography and fluorescence densitometry permits detn. of patulin in fruits and fruit products with great precision and sensitivity. The limit of detection is 10 μg/kg; recovery rates range from 86 to 92%, with a variation coeff. between 5.6 and 13.6%. Interference due to patulin-simulating substances is largely excluded. Patulin concn. ranging from 0.3 to 42 mg/kg were found in the brown-rotten portions of apples. Juices domestically prepared from healthy fruits and fruits free from rotten portions contained no patulin. Patulin concn. ranging from 0.02 to 0.3 mg/l. were observed in commercial apple juices. Patulin values ≤50 mg/l. were found in mouldy apple juices and ≤0.4 mg/kg in mouldy peach preserves. Patulin was not detectable in cereals which had gone mouldy spontaneously, in bread samples, in commercial fruit or vegetable juices (other than apple), or in cider. The fruits and fruit products were analysed not only for patulin, but also for aflatoxin and ochratoxin; the latter 2 toxins were not found in any of the samples examined. The possibilities of manufacturing patulin-free products are discussed. IN

147

[Aflatoxin content in imported groundnuts, coffee, barley, wheat and walnut kernels.]

Haberle, V.; Balenovic, J.; Briski, B.

Hrana i Ishrana 19 (9/10) 451–460 (1978) [8 ref. Sh, en] [Zavod za Zastitu Zdravlja SR Hrvatske, Zagreb, Yugoslavia]

Studies on the aflatoxin content of imported (i) groundnuts (127 samples), (ii) coffee (118), (iii) barley (21), (iv) wheat (15) and (v) walnuts (14) are described. Overall, >50% of samples were free from aflatoxins or contained <1 μg aflatoxin/kg. The max. tolerance of 5 μg/kg in force in the UK, Canada and the Netherlands was complied with by 92.1% of (i), 78.8% of (ii), 33% of (iii), 93.3% of (iv) and 82.9% of (v) samples. No sample exceeded the FAO tolerance of 30 μg/kg, the highest value recorded being 25 μg/kg in (i) and (iv). Coffee samples, initially containing 10 μg aflatoxin/kg, were aflatoxin-free after roasting at 220°C. Similarly, roasting reduced the aflatoxin content of a batch of groundnuts from 3 μg/kg to zero. IN

148

Effect of theobromine on growth and aflatoxin production by Aspergillus parasiticus.

Buchanan, R. L.; Applebaum, R. S.; Conway, P.

Journal of Food Safety 1 (3) 211–216 (1978) [10 ref. En] [Dep. of Nutr. & Food Sci., Drexel Univ., Philadelphia, Pennsylvania 19104, USA]

Theobromine (0, 2, 4 and 8 mg/ml) had little effect on growth and aflatoxin production by Aspergillus parasiticus NRRL 2999 in a glucose-mineral salts-yeast extract medium, indicating that the antiaflatoxigenic activity of cocoa beans is not due to the presence of this methylxanthine. AS

149

Mycotoxin separation on thin layer of corn starch.

Miskovic, D.; Perisic-Janjic, N.

Chromatographia 12 (1) 33–35 (1979) [18 ref. En] [Inst. of Chem., Univ. of Novi Sad, Veljka Vlahovica 2, 21000 Novi Sad, Yugoslavia]

12 mycotoxins (aflatoxins B_1, B_2, G_1, G_2, M_1, M_2, zearalenone, zearalenol, ochratoxins A, B, B ester and C) were separated by TLC on native corn starch using the following solvent systems: (i) benzene, (ii) toluene, (iii) xylene, (iv) benzene/toluene/cyclohexane/ethanol (absolute) at 3:3:5:0.1, or (v) cyclohexane/-benzene/glacial acetic acid at 5:3:0.2, with detection by UV fluorescence at 254–366 nm. Tabulated R_f values showed that best separation was obtained by solvent systems (iii) and (iv); strongest fluorescence was by systems (i), (ii) and (iii). Lower limits of visual detection were: aflatoxins B_1, B_2, G_1 and G_2 10^{-3} ng; M_1 and M_2 10^{-2}ng; ochratoxins A, B and B ester, and C 10^{-1}ng; and zearalenone and zearalenol 10^{0}ng. RM

150

Aflatoxin is degraded at different temperatures and pH values by mycelia of Aspergillus parasiticus.
Doyle, M. P.; Marth, E. H.
European Journal of Applied Microbiology and Biotechnology 6 (1) 95–100 (1978) [13 ref. En] [Dep. of Food Sci., Food Res. Inst., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Blended 9-day-old mycelia of Aspergillus parasiticus NRRL 2999 were tested for their ability to degrade aflatoxins B_1 and G_1 at 7, 19, 28, 36 and 45°C. Rates for degradation of aflatoxin B_1 and G_1 were max. at 28°C. Intermediate rates of aflatoxin degradation were observed at 19 and 36°C while little aflatoxin was degraded at 7 and 45°C. 5 different pH values (2.0, 3.0, 4.0, 5.0, and 6.5) were also tested to determine the effect of pH on ability of blended 9-day-old mycelia of A. parasiticus NRRL 2999 to degrade aflatoxins. The ability of mycelia to degrade aflatoxin was pH-dependent. Of the pH values tested, greatest rates of aflatoxin B_1 and G_1 degradation occurred when pH was in the range of 5–6.5. Little aflatoxin was degraded at pH 4.0 and essentially no aflatoxin was degraded by mycelia at pH 2.0 or 3.0 although some aflatoxin was degraded by acid conditions only at pH values of ≤ 4. AS

151

[Air drying of maize from the mycotoxicological aspect.] Die Belüftungstrocknung von Körnermais unter mykotoxikologischem Aspekt.
Thaler, M.; July, U.; Kuppinger, H.; Müller, H.-M.; Scherer, R.
Getreide, Mehl und Brot 33 (1) 8–11 (1979) [22 ref. De] [Inst. für Tierernährung, Univ. Hohenheim, Postfach 106/06100, 7000 Stuttgart 70, Federal Republic of Germany]

Tests were carried out to determine whether air drying under Central European conditions (35–45% grain moisture, with or without predrying to 19–24% at high (90°C) grain temp.) could prevent losses due to mycotoxins. Various moulds (5 spp. of Aspergillus, 4 of Penicillium and 1 of Fusarium) were used as experimental contaminants. Effects of the conditions on development of aflatoxins B_1, B_2, G_1 and G_2, patulin, and zearalenone were studied. Results (given in tabular and graph form) showed that storage of the 35–45% moisture grain was likely to lead to mycotoxin-induced losses, but that predrying to 19–24% is effective and enables the grain to be stored without mycotoxin-induced losses, providing the height of the heap does not exceed about 110 cm. [See also preceding abstr.] HBr

152

Aflatoxin contamination of field corn: evaluation of regional test plots for early detection.
Lillehoj, E. B.; Kwolek, W. F.; Zuber, M. S.; Calvert, O. H.; Horner, E. S.; Widstrom, N. W.; Guthrie, W. D.; Scott, G. E.; Thompson, D. L.; Findley, W. R.; Bockholt, A. J.
Cereal Chemistry 55 (6) 1007–1013 (1978) [10 ref. En] [N. Regional Res. Cent., USDA, Peoria, Illinois 61604, USA]

Field experiments were performed to provide information on feasibility of developing a system for early detection of potential aflatoxin contamination in preharvest corn. A commercial hybrid adapted for growth in the South and a hybrid adapted to the Corn Belt were grown at 9 diverse locations in the United States. Incidence of aflatoxin during ear development ranged from 0 in Corn Belt samples to 75% in Florida test corn, with no pattern of hybrid difference in toxin occurrence. Incubation of test ears for 7–10 days at 28°C immediately after harvest did not change toxin incidence significantly. Inoculation of Missouri test ears with Aspergillus flavus Link ex. Fr. spores 20 days after flowering provided accumulation of 997 parts/billion of aflatoxin B_1 20 days later. Inoculated ears of the regionally nonadapted variety exhibited higher aflatoxin levels than did corn from the adapted hybrid. Weather data from the test locations provided preliminary evidence for association between temp.-precipitation during corn development and extent of aflatoxin occurrence. Early estimation of aflatoxin in field corn appears to require evaluation of several environmental factors that affect the interaction between developing kernels and corn predators. AS

153

Thin layer chromatographic determination of aflatoxins, ochratoxins, sterigmatocystin, zearalenone, citrinin, T-2 toxin, diacetoxyscirpenol, penicillic acid, patulin, and penitrem A.
Gimeno, A.
Journal of the Association of Official Analytical Chemists 62 (3) 579–585 (1979) [24 ref. En] [Piensos Compuestos Rosell S. A. (Picrosa), Laboratorio Control de Calidad, Francisco Moragas, 12, Manresa, Barcelona, Spain]

A general method is described for determining 16 mycotoxins in grains and meals for food and feed. Mycotoxins are extracted and cleaned up by extracting with solvents of different pH. TLC is used to separate the toxins (29 developing solvents for separation and subsequent confirmation are listed); toxins are then quantitated by the limit detection method. Min. detectable concn. (µg/kg) of mycotoxins in corn, barley, sorghum, oats, millet, rye, wheat, soybean meal, peanut products and sunflower meal are: aflatoxin B_1 or G_1, 4–5; ochratoxin A or ethyl ester A, 140–145; citrinin, 600–

750; zearalenone, 410–500; sterigmatocystin, 140–145; diacetoxyscirpenol, 2400–2600; T-2 toxin, 800–950; patulin, 750–800; penitrem A, 14 000–14 500; and penicillic acid, 3400–3650. DIH

154

Simultaneous extraction and fractionation and thin layer chromatographic determination of 14 mycotoxins in grains.

Takeda, Y.; Isohata, E.; Amano, R.; Uchiyama, M.
Journal of the Association of Official Analytical Chemists 62 (3) 573–578 (1979) [8 ref. En] [Nat. Inst. of Hygienic Sci., Div. of Food, 1-18-1 Kamiyoga Setagaya, Tokyo, Japan 158]

A simple, systematic analytical method for multiple mycotoxins was developed for detecting 14 mycotoxins: aflatoxins B_1, B_2, G_1, and G_2, sterigmatocystin, T-2 toxin, diacetoxyscirpenol, neosolaniol, fusarenon X, zearalenone, ochratoxin A, citrinin, luteoskyrin, and rugulosin. These mycotoxins were extracted with 20 % H_2SO_4/4% KCl/acetonitrile (2+20+178), defatted with isooctane, and transferred to chloroform. The chloroform extract was cleaned up by silica gel column chromatography; the first 10 toxins were eluted with chloroform/methanol (97+3) and the remaining 4 toxins with benzene/acetone/acetic acid (75+20+5). Each fraction was analysed by TLC for the final detn. The method was applied to polished rice, rough rice, corn, wheat, and peanuts as an analytical screening procedure. The detection limits in these commodities ranged from 10.0 to 800.0 μg/kg, depending on the mycotoxin, but all limits were superior to those obtained for the individual mycotoxins by using other methods. AS

155

Analysis of some sampling distributions for quality control of foods.

Rao, V. N. M.; Koehler, P. E.
Journal of Food Science 44 (4) 977–981 (1979) [15 ref. En] [Dep. of Food Sci., Univ. of Georgia, Athens, Georgia 30602, USA]

The sampling distributions of aflatoxin in fresh and roasted pecans, visible mycelium in fresh pecans and total plate count in ground beef were examined using the chi-square and Kolmogorov- Smirnov tests. The Kolmogorov-Smirnov test was found to be more conservative than the chi-square test and a powerful technique for rejection of null hypotheses. The results indicated that many sampling distributions used in quality control of foods deviate significantly from the normal distribution. The sampling distribution for total plate count in ground beef and the distribution of sample means were determined. A critical sample size of at least 5 was found to be necessary to approximate the normal distribution for the sample means. The average and s.d. control charts utilizing the sample size of 5 were established to illustrate the detection of out-of-control samples. IFT

156

Detoxification of oilseed material.

Snamprogetti Spa
British Patent 1 539 903 (1979) [En]

Process is described for the extraction of mycotoxins from oil seed flour under mild conditions which employs a polar organic solvent e.g. n-butyl alcohol containing an aqueous electrolyte (HCl). IFT

157

Screening methods for the detection of thirteen common mycotoxins.

Gorst-Allman, C. P.; Steyn, P. S.
Journal of Chromatography 175 (2) 325–331 (1979) [20 ref. En] [Nat. Chem. Res. Lab., PO Box 395, Pretoria 0001, South Africa]

A study of screening methods for 13 mycotoxins showed that they can be separated as neutral and acidic metabolites. R_f values were determined in several solvent systems. Reactions of the mycotoxins with well known spray reagents were investigated, and their detection limits were established. A general procedure for extraction of mycotoxins from contaminated samples is described; it was tested with sterilized maize samples contaminated with Aspergillus flavus, A. versicolor and Penicillium cyclopium. AS

158

[^{14}C]Aflatoxin B_1 as an indicator of toxin destruction during ammoniation of contaminated peanut meal.

Lee, L. S.; Conkerton, E. J.; Ory, R. L.; Bennett, J. W.
Journal of Agricultural and Food Chemistry 27 (3) 598–602 (1979) [13 ref. En] [S. Regional Res. Centre, USDA, New Orleans, Louisiana 70179, USA]

[^{14}C]Aflatoxin B_1 was used to trace the destruction of aflatoxin during ammoniation. 'Spiked' meal (meal containing added [^{14}C]aflatoxin) was ammoniated at 75°C, 35 lb/in^2 gauge, for 30 min in a laboratory reactor, and the distribution of label was measured in subsequent fractions. Only 45–50% of the activity was detected in the ammoniated meal after initial air-drying, 8% was detected in the humins remaining after acid hydrolyses, 4–6% was associated with the protein, and 33–36% was associated with the nonprotein residue. This residue contained all of the unreacted aflatoxin B_1, which accounted for 0.3% of the total activity. Some activity was detected in volatiles swept from the reaction vessel after the ammoniation treatment. AS

159

High pressure liquid chromatographic determination of aflatoxins in corn.

Pons, W. A., Jr.
Journal of the Association of Official Analytical Chemists 62 (3) 586–594 (1979) [21 ref. En] [USDA, Sci. & Education Admin., S. Regional Res. Centre, New Orleans, Louisiana 70179, USA]

A high pressure liquid chromatographic (HPLC) method is proposed for determining aflatoxins in corn. The sample is extracted with methanol/10% NaCl (4+1), pigments are precipitated with zinc acetate, and the extract is cleaned up on a small (2 g) silica gel column. Aflatoxins in the purified extract are resolved by normal phase HPLC on a microparticulate (10 μm) silica gel column with water-saturated chloroform/cyclohexane/acetonitrile solvent, and detected by fluorescence on a silica gel-packed flowcell.

The method was compared with chloroform/water extraction of the official CB method on 15 samples of contaminated corn. In 5 of the 6 samples containing aflatoxins B_1, B_2, G_1, and G_2, methanol/10% NaCl extracted more aflatoxin than did chloroform/water, as measured both by HPLC and by TLC. In samples containing only B_1 and B_2, the 2 extraction solvents were virtually equivalent. Agreement was good between HPLC and TLC for each extraction solvent. Average recovery of aflatoxins B_1, B_2, G_1, and G_2 added to yellow cornmeal at 3 levels was >90%. AS

160

Laser fluorometric determination of aflatoxin B_1 in corn.
Deibold, G. J.; Karny, N.; Zare, R. N.; Seitz, L. M.
Journal of the Association of Official Analytical Chemists 62 (3) 564-569 (1979) [13 ref. En] [Dept. of Chem. Stanford Univ., Stanford, California 94305, USA]

A 2-step chromatographic separation, using both TLC and high pressure liquid chromatography (HPLC), in conjunction with the high sensitivity of laser fluorometry permits extension of the detection limits of aflatoxin contamination in corn to 0.1 µg/kg with a 26% root mean square variation. Aflatoxin B_1 is extracted from corn with water-methanol and cleaned up by TLC. The recovery of aflatoxin from the TLC plates was linear from 10 to 1000 pg. Aflatoxin B_1 is converted to the more highly fluorescent B_{2A} derivative by treatment with 1N HCl. Experiments with aflatoxin B_1 standards establish a constant conversion to B_{2A} over approx. 3 orders of magnitude in B_1 concn. An extract of the B_{2A} aflatoxin derivative is injected onto a reverse phase HPLC column. A flowing droplet of eluant is irradiated by an amplitude-modulated 325 nm He-Cd ion laser beam, and fluorescence from the droplet is detected by a lock-in amplifier in phase with the laser modulation. Several chromatograms are presented that demonstrate the capability of this procedure for removing interfering components in the corn extract. AS

161

Determination of mycophenolic acid, penicillic acid, patulin, sterigmatocystin, and aflatoxins in cheese.
Siriwardana, M. G.; Lafont, P.
Journal of Dairy Science 62 (7) 1145-1148 (1979) [12 ref. En] [INSERM, Unite de Recherche de Toxicologie Alimentaire, 44 Chemin de Ronde, 78110 Le Vasinet, France]

The method is based on selective extraction with a mixture of equal volumes of 5% NaCl, methanol and acetone, precipitation of caseins at −25°C, defatting with hexane, and removal of extraneous matter by transfer of mycotoxins to chloroform and ethyl acetate. The extract is purified further by column chromatography. Mycotoxins are estimated on TLC chromatograms by fluorescence comparisons. Mycophenolic acid, patulin and penicillic acid are visualized with diethylamine. Limits of detection in cheese are about 20 µg/kg for mycophenolic acid, patulin and sterigmatocystin, 30 µg/kg for penicillic acid, and 1 µg/kg for aflatoxins B_1 and M_1. AS

162

Territrems, tremorgenic mycotoxins of Aspergillus terreus.
Ling, K. H.; Yang, C. K.; Peng, F. T.
Applied and Environmental Microbiology **37** (3) 355-357 (1979) [8 ref. En] [Inst. of Biochem., Coll. of Med., Nat. Taiwan Univ., Taipei, Taiwan]

The tremorgenic mycotoxins isolated from Aspergillus terreus (a fungus which contaminates stored unhulled rice) were given the trivial names territrem A and territrem B instead of their previous designations of C_1 and C_2, resp. High-resolution MS data suggested the molecular formulae to be $C_{28}H_{30}O_9$ and $C_{29}H_{34}O_9$, resp. They were partially characterized by UV, IR, proton magnetic resonance, and MS. The spectroscopic evidence indicated that their chemical structures were very similar. Procedures of purification were also revised for the complete separation of these 2 chemically related compounds. [See also following abstr.] AS

163

Differentiation of aflatoxins from territrems.
Ling, K. H.; Yang, C. K.; Huang, H. C.
Applied and Environmental Microbiology **37** (3) 358-361 (1979) [10 ref. En] [Inst. of Biochem., Coll. of Med., Nat. Taiwan Univ., Taipei, Taiwan]

3 methods were adopted for differentiation of aflatoxins B_1 and B_2 from territrems A and B. (i) TLC coupled with chemical confirmation. A significant decrease in the R_f value of trifluoroacetic acid-treated aflatoxin B_1 developed in chloroform-acetone (85:15, v/v) satisfactorily differentiated this toxin from the other 3. (ii) High-pressure liquid chromatography monitored synchronously at 365 and 335 nm. The ratio derived from this double-wavelength detection could serve as an indicator of the presence of each toxin. (iii) Velasco's flurotoxin meter method, which is used for detn. of aflatoxins in the range 0-50 ng/ml, was not significantly affected by territrems even when they were present at the µg/ml level. [See also preceding abstr.] AS

164

Toxicology, biochemistry and pathology of mycotoxins. [Book]
Uraguchi, K.; Yamazaki, M. (Editors)
viii + 288pp. ISBN 0-470-26423-3 (1978) [many ref. En] New York, USA; Halsted Press, John Wiley & Sons Ltd & Tokyo, Japan; Kodansha Ltd. Price £19.95 [Tokyo Univ. of Agric., Sakuragaoka, Setagayaku, Tokyo 156, Japan]

This book, by leading Japanese workers, gives a broad survey of the occurrence and properties of mycotoxins and their role in human health problems. Chapters are: Introduction, by K. Uraguchi (pp. 1-11, 44 ref.). Current scope of mycotoxin research from the viewpoint of food mycology, by H. Kurata (pp. 13-64, 421 ref.), which includes important mycotoxin-producing fungi, significance of the mycoflora of various foodstuffs (pp. 31-48), surveys on the mycoflora of dietary foods, natural occurrence of mycotoxins in foodstuffs, and control. Chemistry of mycotoxins, by M. Yamazaki (pp. 65-106, 145 ref.). Toxicology and biochemistry of mycotoxins, by Y. Ueno & I. Ueno (pp. 107-188, 162 ref.). Morphological and functional damage of cells and tissues, by K. Tereo & Y. Ueno (pp. 189-238, 165 ref.). Carcinogenicity of mycotoxins, by M. Enomoto (pp. 239-262, 38 ref.). Aflatoxin: investigations on traditional foods and imported foodstuffs in Japan, by K. Aibara (pp. 263-278, 40 ref.). A subject index and index of organisms are included. AL

165

The role of adsorption in the elimination of aflatoxin B_1 from contaminated media.
Masimango, N.; Remacle, J.; Ramaut, J. L.
European Journal of Applied Microbiology and Biotechnology 6 (1) 101-105 (1978) [9 ref. En] [Lab. of Pharmaceutical Bot., Univ. of Liege, Sart Tilman, B-4000 Liege, Belgium]

Studies on the potential for removal of aflatoxin B_1 from aqueous buffer model solutions by adsorption on fungal mycelium or various clays are described. Treatment with coarse wet mycelium of non-toxigenic strains of Aspergillus flavus reduced the aflatoxin concn. in the medium to 30-46% of the initial value; disintegrated mycelium had a greater adsorption effect, reducing aflatoxin concn. to 10-20% of the initial value. Treatment with clays (18 types tested) considerably reduced the aflatoxin concn. in the supernatant, residual aflatoxin concn. ranging from traces to 30%; bentonite showed the greatest aflatoxin adsorption capacity of the clays studied. Vermiculite had a greater aflatoxin adsorption capacity in the finely-powdered than the coarse form; particle size had little effect on the adsorption capacity of montmorillonite. Heating at 650°C increased the aflatoxin adsorption capacity of bentonite, montmorillonite and sepiolite, the increase being greatest for sepiolite. It is suggested that it might be possible to purify aflatoxin-contaminated liquid foods by an adsorption process. AJDW

166

Geographical distribution of aflatoxin-producing fungi inhabiting in Southeast Asia.
Manabe, M.; Tsurata, O.
JARQ (Japan Agricultural Research Quarterly) 12 (4) 224-227 (1978) [10 ref. En] [Food Protection & Preservation Div., Nat. Food Res. Inst., Japan]

24 soil samples and 16 grain samples from the Philippines, 21 soil and 8 grain samples from Indonesia and 17 soil and 8 grain samples from Thailand were examined for frequency of fungal presence. Aspergillus flavus and A. niger showed high frequencies with every sample and the Mucorales also showed high frequencies except for Indonesian soil samples. A. terreus, Fusarium spp. and Trichoderma viride showed higher frequencies in soil samples than in grain samples. A. tamarii occurred with greater frequency in grains than in soils. The strains detected only from the grain samples were Penicillium islandicum, A. versicolor and Eurotium spp. The aflatoxin productivity of the strains of the A. flavus group was examined with those isolated from 98 soil and grain samples. 40 strains out of 84 of A. flavus showed aflatoxin productivity on the rice culture containing Zn ion. None of the 37 strains of A. tamarii produced any aflatoxins. VJG

167

[Hygienic significance of sterigmatocystin in foods of vegetable origin. II. Production of sterigmatocystin by Aspergillus versicolor.] Zur hygienischen Bedeutung von Sterigmatocystin in pflanzlichen Lebensmitteln. 2. Zur Bildung von Sterigmatocystin durch Aspergillus versicolor.
Paul, P.; Thurm, V.
Nahrung 23 (2) 117-120 (1979) [11 ref. De, en, ru] [Inst. für Exp. Epidemiologie, Wernigerode, German Democratic Republic]

Samples of various foods of fruit and vegetable origin were inoculated with a spore suspension of a toxigenic strain of Aspergillus versicolor, then incubated for 14 days at 22°C. The extent of growth of A. versicolor was then evaluated, and the product was tested for sterigmatocystin. A table of results is given. Sterigmatocystin concn. in the incubated samples were: apple puree, 2 μg/g; plums, 1.25 μg/g; gooseberry preserves, 9.4 μg/g; sweet cherries, 1.4 μg/g; grapes, 10 μg/g; and grape juice, 66 μg/l. No sterigmatocystin was detectable in samples of tomato puree, pear + orange juice, apple juice and raspberry juice. [See also preceding abstr.] IN

168

A survey for the presence of mycotoxins in samples of food grains collected in the Tamilnadu region. (In 'Proceedings of the First Indian Convention of Food Scientists and Technologists' [see FSTA (1979) 11 12A871]) [Lecture]
Neelakantan, S.; Balasubramanian, T.; Balasaraswathi, R.; Indra Jasmine, G.; Swaminathan, R.
p. 74, No. 7.1 (1979) [En] [Dep. of Food Tech., Tamilnadu Agric. Univ., Coimbatore, India]

931 samples of grain, mostly rice and wheat, were obtained from godowns and markets in the Tamilnadu region. The samples were ground, extracted with chloroform, filtered, passed through anhydrous Na_2SO_4, concentrated and analysed for mycotoxins by TLC. 20 samples, most of which were visibly mouldy, contained sterigmatocystin. Other mycotoxins could not be positively identified because of occurrence of interfering fluorescent spots on the TLC plates. JA

169

Production and characterization of antibody against aflatoxin M_1.
Harder, W. O.; Chu, F. S.
Experientia 35 (8) 1104-1107 (1979) [24 ref. En] [Dep. of Food Microbiol. & Toxicology, Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Antibody against aflatoxin M_1 [wanted to develop a radioimmunoassay for aflatoxin M_1 in dairy products] was obtained after immunization of rabbits with bovine serum albumin-aflatoxin M_1 oxime conjugate. The antibody has greatest binding efficiency for aflatoxin M_1, and was less efficient for aflatoxin B_1. Cross-reaction of antibody with aflatoxin Q_1, aflatoxicol, and aflatoxin B_{2a} was weak. Aflatoxins B_2, G_1, and G_2 and aflatoxin B_1-guanine adduct showed almost no cross-reaction with the antibody. Sensitivity of the binding assay for aflatoxin M_1 detection is in the range 1–10 ng/assay. Detailed methods for the preparation of the conjugate, production of immune serum, and methods for antibody detn. are described. AS

170

Now aflatoxin contamination of milk can be prevented on the farm.
Lough, O. G.
Hoard's Dairyman 124 (8) 586, 642 (1979) [En] [Univ. of Arizona, Phoenix, Arizona, USA]

Feeding of cottonseed from which the aflatoxins had been partially removed (method described) to dairy cattle resulted in milk yields with an average of 0.14 µg aflatoxin/kg (vs. 0.45 µg/kg with untreated cottonseed). HBr

171

[Aflatoxins in milk and milk products.]
Sutic, M.; Mitic, S.; Svilar, N.
Mljekarstvo 29 (4) 74–80 (1979) [36 ref. Sh] [Poljoprivredni Fak., Zemun, Yugoslavia]

About 1000 samples of cows' and ewes' milk and milk products (cheese, cultured milks, kajmak, dried milk) obtained from different dairy plants, and feeds from 1 farm were examined in this study. From 223 of the 1000 samples were isolated 221 strains of moulds comprising Penicillium (59.13%), Alternaria (11.75%), Fusarium (8.49%); Cladosporium (8.1%), Mucor (7.15%); Aspergillus (3.16%), Oidium lactis [Geotrichum candidum] (1.35%), Verticillium (0.45%) and Micelia sterilia (0.45%). Of 7 Aspergillus isolates, 2 were A. niger, 3 A. ochraceus, and 2 A. flavus (both synthesizing aflatoxin B_1). Of 105 milk samples analysed for the presence of aflatoxin, 5 were positive, max. concn. being 2.5 mg/l.; for 68 samples of various feeds the number of positive samples was 20 (lucerne being mainly responsible). FL

172

An examination of Queensland milk and cheese for possible aflatoxin contamination.
Dulley, J. R.; Houlihan, D. B.
Australian Journal of Dairy Technology 34 (1) 12–13 (1979) [8 ref. En] [Otto Madsen Dairy Res. Lab., Dep. of Primary Ind., Queensland, Australia]

No aflatoxin could be detected in the following: 22 samples of bottled pasteurized milk from factories throughout Queensland; milk samples from 3 individual farms where cows' food had been supplemented with grain and groundnut kernel meal, groundnut hay, or groundnut shells and reject kernels; 5 Cheddar cheese samples; Blue vein cheese; Edam cheese; or a processed cheese containing groundnuts. The extraction procedure used was able to recover 75% aflatoxin B_1 and the limit of detection was 0.1 µg/l.; any aflatoxin M_1 present would have been shown qualitatively on TLC plates by comparison with a crude mixture of aflatoxins including M_1. CDP

173

[Aflatoxin determination in cheeses.]
Bartos, J.; Matyas, Z.
Veterinarni Medicina 24 (3) 177–183 (1979) [28 ref. Cs, ru, en, de] [Vyzkumny Ustav Vet. Lekarstvi, 621 32 Brno, Czechoslovakia]

A 120-g sample of cheese, homogenized with an equal vol. of distilled water, was examined for aflatoxins by the procedure of Tuinstra & Bronsgeest [FSTA (1976) 8 1P159]. 54 samples of cheese examined in this way, between Dec. 1977 and May 1978, consisted of 16 samples of soft cheeses (Babelka, Smetanovy syr, Marsovsky syr, Romadur, Pivni syr and Blatacke Zlato var.), 9 of hard cheeses (Emmental, Edam brick, smoked salami, Cedar and Svetlan var.), 2 of mould cheeses (Hermelin and Niva var.), 22 of processed cheeses (17 named var.), 2 of Olomoucke tvaruzky and 1 of Kastelan (grated cheese with onion). Levels of aflatoxin M_1 detected in 24% of the samples were: Babelka and Pivni syr, 4 ng/kg; Marsovsky syr, trace to 9 ng/kg; Romadur, 9–10 ng/kg; Svetlan, 9 ng/kg; Admiral and Limburg processed cheeses, traces and traces to 5 ng/kg, resp.; and Kastelan cheese, 5 ng/kg. All positive findings were well below the Czechoslovak tolerance limits in foods for children (1 µg/kg) and adults (5 µg/kg). SKK

174

Health laws and regulations – Benelux Economic Union.
World Health Organization
International Digest of Health Legislation 29 (1) 5 (1978) [En] [Geneva, Switzerland]

The following regulation relating to food safety is presented: Decision M (77) 5 of 2 June 1977 of the Committee of Ministers of the Benelux Economic Union concerning the application of Benelux reference methods of analysis with respect to aflatoxin in groundnuts and products derived therefrom. The Government of each of the 3 Benelux countries is to submit a report to the Committee of Ministers on the measures taken for the enforcement of this decision. VJG

175

Health laws and regulations – Federal Republic of Germany.
World Health Organization
International Digest of Health Legislation 29 (1) 84–104 (1978) [En] [Geneva, Switzerland]

A selection of Federal Republic of Germany health laws and regulations is presented including the following which relate to food hygiene: Ordinance of 30 Nov. 1976 on max. levels of aflatoxins in foodstuffs, prohibits the marketing as foodstuffs or use in the manufacture of foodstuffs of the following products if they contain > 10 µg/kg in total of aflatoxins B_1, B_2, G_1, and G_2 or > 5 µg/kg of aflatoxin B_1: hazelnuts, walnuts, Brazil nuts, pistachios, almonds, apricot and peach stones, grated coconut, poppy and sesame seeds, and cereals and cereal products; Honey Ordinance of 13 Dec. 1976, which repeals the Ordinance of

21 March 1930 on honey, contains provisions governing the characteristics, packaging and labelling of, and trade in honey; Ordinance of 13 Dec. 1976 amending the Colouring Matters Ordinance and other ordinances in the foodstuffs field; Ordinance of 24 May 1977 on max. levels of erucic acid in foodstuffs, prescribes that edible oils, edible fats and mixtures thereof that are supplied to the consumer as such and foodstuffs in whose production edible oils, edible fats or mixtures are used and which have a total fat content exceeding 5%, may not be commercially marketed if their erucic acid level exceeds 5% of the total fatty acid content in the fatty phase (products in which erucic acid does not exceed 10% may continue to be commercially marketed until 30 June 1979); and Ordinance of 16 June 1977 on the technical requirements for persons without scientific training who are employed in foodstuffs control. VJG

COPYRIGHT REGULATIONS

Form of Declaration and Undertaking

To the Editor, International Food Information Service, Lane End House, Shinfield, Reading, RG2 9BB, Berkshire, England.

1. I...

   of...

   Hereby request you to make and supply to me a

   photocopy of the artice covered by Abstract No. ....

   Journal name...

   Volume .... Part .... Pages .... Year ....

   which I require for the purposes of research or private study.

2. I have not previously been supplied with a copy of the said article/part of the said work by any librarian.

3. I undertake that if a copy is supplied to me in compliance with the request made above, I will not use it except for the purposes of research or private study.

   Signature .... Date ....

   (Note: This must be the personal signature of the person making the request. A stamped or typewritten signature or the signature of an agent is NOT sufficient.)

4. Send this form and remittance (12p per page for photocopies, min. charge £1.50 per article) to the above address. A deposit or credit system for payment is also in operation. Details are available on request.

Note: Additional forms are available on-request.

Food Annotated Bibliographies (FABs)

	Up to 1978 Price	Vol. 11 (1979) Price	Vol. 12 (1980) 12 monthly issues Price
1. Application of Reverse Osmosis to Food Processing	☐ £10.00	☐ £5.00	☐ £7.50
2. New Sources of Food Protein	☐ £18.00	☐ £11.50	☐ £17.50
3. Natural and Synthetic Sweeteners	☐ £11.00	☐ £6.00	☐ £9.00
4. Techniques for Analysis of Flavour Volatiles	☐ £12.00	☐ £7.00	☐ £10.50
5. Microwaves in Food Processing	☐ £9.50	☐ £4.50	☐ £7.50
6. Texture Analysis of Foods	☐ £15.00	☐ £7.50	☐ £11.50
7. Synthetic Dairy Products	☐ £10.00	☐ £5.00	☐ £8.00
8. Acidulants in Food	☐ £10.00	☐ £5.00	☐ £7.50
9. Agglomeration of Powders	☐ £10.00	☐ £5.00	☐ £7.50
10. Aseptic Packaging	☐ £10.00	☐ £6.00	☐ £8.50
11. EEC Regulations	☐ £10.00	☐ £5.00	☐ £7.50
12. Toxicology of Food Additives	☐ £11.00	☐ £6.00	☐ £9.00
13. Deep Fat Frying	☐ £13.00	☐ £7.00	☐ £10.50
14. Viscosity of Foods	☐ £11.00	☐ £5.50	☐ £8.00
15. Taste Panels in Food Science	☐ £12.00	☐ £7.00	☐ £10.50
16. Taints in Food	☐ £10.00	☐ £5.50	☐ £8.50
17. Microbial Toxins in Food	☐ £12.00	☐ £7.00	☐ £10.50
18. Smoked Food Products	☐ £10.00	☐ £5.00	☐ £7.50
19. Disposal of Waste Food Products	☐ £14.50	☐ £7.50	☐ £11.50
20. Use of Glucose in Food Products	☐ £9.50	☐ £4.50	☐ £7.50
21. Emulsifiers in Foods	☐ £11.00	☐ £6.00	☐ £9.00
22. Stabilizers in Foods	☐ £11.00	☐ £6.00	☐ £9.00
23. Staling and Antistaling Additives	☐ £9.50	☐ £4.50	☐ £7.50
24. Catering Industry	☐ £9.50	☐ £5.50	☐ £8.00
25. Antioxidants	☐ £11.00	☐ £6.00	☐ £9.00
26. Nitrosamines	☐ £9.50	☐ £4.50	☐ £7.50
27. Content and Analysis of Mercury in Foods	☐ £10.00	☐ £6.00	☐ £9.00
28. Content and Analysis of Lead in Foods	☐ £10.00	☐ £5.00	☐ £7.50
29. Heatable Packs	☐ £9.50	☐ £4.50	☐ £7.00
30. Sulphur Dioxide in Food Products	☐ £10.00	☐ £5.00	☐ £7.50
31. Lactic Acid Bacteria in Beverages and Food	☐ £12.00	☐ £7.00	☐ £10.50
32. Colorants	☐ £10.00	☐ £5.00	☐ £7.50
33. Browning of Foods	☐ £10.00	☐ £5.00	☐ £7.50
34. Aflatoxins	☐ £10.00	☐ £6.00	☐ £9.00
35. Antibiotic Properties and Residues in Food excluding Nisin	☐ £9.00	☐ £4.50	☐ £7.00
36. Nisin	☐ £9.00	☐ £4.50	☐ £7.00
37. Cadmium in Foods	☐ £9.50	☐ £5.00	☐ £7.50
38. Coffee	☐ £10.00	☐ £5.50	☐ £8.50
39. Sorbic Acid	☐ £10.00	☐ £5.00	☐ £7.50
40. Arsenic in Foods	☐ £9.00	☐ £5.00	☐ £7.50
41. Ascorbic Acid	☐ £9.00	☐ £5.50	☐ £8.50
42. Thickeners and Gelling Agents	☐ £8.50	☐ £5.00	☐ £7.50
43. Pseudomonadaceae and Food Processing	☐ £9.00	☐ £4.50	☐ £7.00
44. Spores in Food	☐ £8.00	☐ £5.50	☐ £8.00
45. Breadmaking	☐ £10.00	☐ £5.00	☐ £7.50
46. Bread Properties	☐ £9.00	☐ £4.50	☐ £7.00
47. Food Science and Technology Books	☐ £15.00	☐ £9.00	☐ £15.00
48. Nitrates and Nitrates in Meat Products	☐ £10.00	☐ £5.50	☐ £8.50
49. Eggs and Poultry Meat	☐ £15.00	☐ £8.00	☐ £12.00
50. Mycotoxins in Foods (Excluding Aflatoxins and Microbial Toxins)	☐ £8.00	☐ £5.00	☐ £7.50
51. Meat Canning	☐ £10.00	☐ £5.00	☐ £8.50

Prices include postage by surface mail. For airmail rates, please apply to address below.
To order, or obtain further information, mark the item required, add your name and address and send cash, cheque or postal order to:

INTERNATIONAL FOOD INFORMATION SERVICE (IFIS)
LANE END HOUSE
SHINFIELD, READING, RG2 9BB
ENGLAND

Name ....

Address ....

INTERNATIONAL FOOD INFORMATION SERVICE

ifis

FAB 34

AFLATOXINS

SELECTED FROM VOLUME 12
FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

under the direction of

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks; Gesellschaft fur Information und Dokumentation, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen.

INTRODUCTION

Food Annotated Bibliographies (FABs) are collections of abstracts on specific topics in food science and technology. The topics are chosen by the staff of the International Food Information Service as being of particular interest or importance. The topics normally interest individual workers, who may not require the full information provided in Food Science and Technology Abstracts, from which the abstracts for FABs are taken. The size and the cost of the FABs are controlled as much as possible with the interests of individual workers in mind.

Titles of the FABs now available are given on the back cover of this booklet. For up-to-date lists of FABs or suggestions for new topics please write to the address on the back cover. New subjects are searched for at least the five most recent volumes of Food Science and Technology Abstracts. Thereafter each FAB is updated monthly. Copies of each months abstracts on any topic may be obtained as indicated on the back cover of this publication. At the end of each volume of up-dating, the abstracts are merged and made available as a separate supplement to the original FAB.

Some of the larger FABs have been divided into sections to facilitate use. FAB 47 also has a subject and author index provided.

Copies of all original articles referred to in the abstracts may be bought (or occasionally borrowed) from the International Food Information Service. A form for ordering these is provided at the end of this FAB.

Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journals, patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

EDITOR

1

Symposium on toxins in foods, June 29, 1975.
[Conference proceedings]
India, Nutrition Society of India
Proceedings of the Nutrition Society of India No. 19, vi + 1-65 (1975) [En]

This symposium on toxins in food, held at Hyderabad, included the following papers: Breeding of bajra for resistance to fungus infection, by B. R. Murthy (pp. 12-17). Aflatoxicosis in humans, by K. A. V. R. Krishnamachari, R. V. Bhat, V. Nagarajan & T. B. G. Tilak (pp. 18-22, 10 ref.). Breeding of low toxin containing var. of *Lathyrus sativus*, by P. L. N. Somayajulu, G. K. Barat, Shiv Prakash, B. K. Misra & Y. C. Srivastava (pp. 35-39, 8 ref.); and a summary of the discussion (pp. 60-65). A further 6 papers are abstracted separately in FSTA and are in the author index under India, Nutrition Society of India [Toxins Symposium]. AL

2

Reversed phase high performance liquid chromatographic procedure for determining aflatoxins in foods and beverages using fluorescence detection.
Takahashi, D. M.; Beebe, R. M.
Abstracts of Papers, American Chemical Society 177 (1) AGFD 47 (1979) [En] [FDA, 526 Federal Office Building, 50 United Nations Plaza, San Francisco, California 94102, USA]

A high performance liquid chromatography (HPLC) method for detn. of aflatoxins B_1, B_2, G_1 and G_2 in various liquid and solid food samples is described. Aflatoxins B_1 and G_1 are treated with trifluoroacetic acid to enhance their fluorescence. Analyses of both treated and untreated aflatoxins by HPLC provides immediate quantitation and chemical confirmation. A typical HPLC run takes about 15 min. At present, the min. detectable quantity of aflatoxins is 5 pg, but with the advent of laser fluorometry this level will improve. AL

3

High performance radial chromatography of aflatoxins.
Vitek, R. K.; Waltking, A. E.; Kent, D. M.
Abstracts of Papers, American Chemical Society 177 (1) AGFD 48 (1979) [En] [V-tech Corp., 16229 W. Ryerson Road., New Berlin, Wisconsin 53151, USA]

High performance radial chromatography (HPRC) is a relatively new technique that greatly improves the resolving power of high performance TLC precoated plates. This flat-bed system produces radial band separations of superior resolution over the conventional TLC spots. R_f retention data is reproducible to 0.02 cm. Mixtures of aflatoxins may be separated in about 8 min. HPRC is recommended as an excellent screening method due to its speed, resolution, and economy of materials. Sample size is normally in the µl range, and solvent consumption is 250 µl. Results are accurate and reproducible. AS

4

Mycotoxins in foods. [Lecture]
Sreenivasa Murthy, V.
Proceedings of the Nutrition Society of India No. 19, 1-6 (1975) [11 ref. En] [Cent. Food Tech. Res. Inst., Mysore, India]

Causes of the high aflatoxin levels in food, in particular in groundnuts and groundnut oil, are dicussed. A survey of 22 market samples of unrefined groundnut oil showed aflatoxin levels ranging from 0 to 2.6 p.p.m. With the increase in export of handpicked seeds, the quantity of infected seeds getting crushed for edible oil seems to have increased considerably in recent yr. [See FSTA (1980) 12 1C10.] AL

5

The fate of aflatoxin in naturally contaminated corn during the ethanol fermentation.
Lillehoj, E. B.; Lagoda, A.; Maisch, W. F.
Canadian Journal of Microbiology 25 (8) 911-914 (1979) [9 ref. En, fr] [N. Regional Res. Cent., USDA, Peoria, Illinois 61604, USA]

Corn naturally contaminated with aflatoxin was used as a substrate in ethanol fermentation. Distribution of toxin in several process and recovery fractions was identified. Although little degradation of the mycotoxin occurred during fermentation, no toxin appeared in the distilled alcohol. NaOH, NH_4OH, HOCl and H_2O_2 were identified as efficient agents of toxin degradation. AS

6

Aflatoxigenic potential of dried figs, apricots, pineapples, and raisins.
Morton, S. G.; Eadie, T.; Llewellyn, G. C.
Journal of the Association of Official Analytical Chemists 62 (4) 958-962 (1979) [22 ref. En] [Dep. of Biol., Virginia Commonwealth Univ., Richmond, Virginia 23284, USA]

Spores from 3 aflatoxigenic strains were applied to the surface of dried figs, pineapple slices, apricots, and raisins. Half of the samples of each foodstuff were autoclaved (cooked) before inoculation. All 3 strains produced some toxin but not in all of the foodstuffs. No aflatoxins were found in any of the raisin cultures. The overall potential for toxin production in the dried fruit was apricot > fig > pineapple > raisin. Among the cooled substrates, the order was apricot > pineapple > fig = raisin. For the raw dried fruits, the ranking was fig > pineapple > apricot ≥ raisin. Pineapple was considered the best broad spectrum substrate of the foodstuffs evaluated in the study. AS

7

Note on inactivation of aflatoxin in ammonia-treated shelled corn at low temperatures.
Nofsinger, G. W.; Anderson, R. A.
Cereal Chemistry 56 (2) 120-121 (1979) [5 ref. En] [N. Regional Res. Cent., USDA, Peoria, Illinois 61604, USA]

Contaminated lots of shelled corn (initial moisture content 9.9-12.2% wet basis) were treated with 1.0 or 1.5% (dry basis) NH_3 in polyethylene sacks and stored in these containers for 179 days Dec.-May at ambient temp. (min. and max. temp. shown graphically for storage period). 3 lots of corn were studied having the following initial levels of contamination with aflatoxin B_1 and B_2, resp. (parts/billion): (i) 896, 115, (ii) 461, 71, (iii) 266, 22. After 179 days with 1.0% NH_3 added these levels were (i) 103, 11, (ii) 27, 3, (iii) 15, 1; corresponding results for 1.5% NH_3 were (i) 32, 3, (ii) 8,1 and (iii) 2, not detectable. Levels of aflatoxin B_1 in samples during the storage period are displayed graphically; after a marked inactivation of aflatoxin during the 1st 8 days there was an intermediate rise in aflatoxin content up to 90 days, especially for sample (i), followed by further inactivation. Aflatoxins G_1 and G_2 were not detectable in any sample at any time. FDA guideline for max. total aflatoxin content is 20 parts/billion. DIH

8

A proposal to reduce aflatoxin levels in groundnut meal during solvent extraction. [Lecture]
Achaya, K. T.
Proceedings of the Nutrition Society of India No. 19, 57-59 (1975) [En] [Protein Foods & Nutr. Development Ass. of India, Bombay, India]

Present measures for prevention of reduction of aflatoxin levels in groundnuts are described and a suggestion is made that during solvent extraction of groundnut meal, the solvent, hexane, should carry dissolved NH_3 gas, which is known to destroy aflatoxin. Further work will be required to determine the NH_3 concn. needed, effect on meal and oil quality, and costs. [See FSTA (1980) 12 1C10.] AL

9

[Variability of lactic acid bacteria caused by aflatoxin B_1 and its importance to manufacture.]
Sutic, M.; Banina, A.
Mljekarstvo 29 (5) 106-111 (1979) [21 ref. Sh] [Poljoprivredni Fak., Belgrade, Yugoslavia]

Aflatoxin B_1 (AB_1) produced by Aspergillus flavus MP_1 and checked spectrophotometrically and by a biological test was used in this study. The toxin affected the morphology and physiology of lactic acid bacteria, the effect depending on bacterial strain, aflatoxin concn. and duration of its action. With Lactobacillus helveticus, AB_1 increased and with L. casei in some cases slightly decreased the width of the cells, whilst in cells of L. bulgaricus it caused elongation of the cells, thickening of the chains in parts and formation of granules. Streptococcus lactis and Str. thermophilus formed longer chains, some cells showing thickening, in the presence of AB_1. The toxin increased acid production in L. helveticus but decreased it in L. casei. In mixed cultures of L. bulgaricus and Str. thermophilus and in a yoghurt starter the presence of 15-50 µg AB_1/ml retarded milk coagulation by 90-105 min in relation to AB_1-free controls. FL

10

Health laws and regulations - Belgium.
World Health Organization
International Digest of Health Legislation 29 (4) 721-726 (1978) [En] [Geneva, Switzerland]

A selection of Belgian health laws and regulations is presented including the following which relate to food hygiene: Crown Order of 29 July 1977 amending Annexes 2 (Regenerated cellulose film) and 3 (Plastics materials and articles) of the Crown Order of 12 Sept. 1972 concerning the manufacture and use of, and trade in, articles and materials intended to come into contact with foodstuffs and substances used as food; and Crown Order of 16 Sept. 1977 establishing the reference method of analysis applicable to aflatoxin in groundnuts and products derived therefrom, is made in pursuance of the Law of 24 Jan., 1977 on the health of consumers with regard to foodstuffs and other products and Decision M (77) 5 of 2 June 1977 of the Committee of Ministers of the Benelux Economic Union. VJG

11

Health laws and regulations - United States of America.
World Health Organization
International Digest of Health Legislation 29 (3) 648-686 (1978) [En] [Geneva, Switzerland]

A selection of USA health laws and regulations is presented including the following which relate to food hygiene: Part 318 of Subchapter A of Chapter III of Title 7 (Agriculture) of the US Code of Federal Regulations (dated 31 Aug. 1977) establishes the requirement that all cooked beef roast be cooked to a min. internal temp. of 145°F so as to destroy Salmonella food poisoning organisms; An Act (Public Law 95-190) amends section 2 of the Safe Drinking Water Act (Public Law 93-523) to extend and increase authorizations provided for public water systems (dated 16 Nov. 1977); An Act (Public Law 95-203) (i) to require studies concerning carcinogenic and other toxic substances in food, the regulation of such food, the impurities in and toxicity of saccharin, and the health benefits, if any, resulting from the use of non-nutritive sweeteners, (ii) to prohibit for 18 months the Secretary of Health, Education and Welfare from taking certain action restricting the continued use of saccharin as a food, drug and cosmetic, and (iii) to require certain labels and notices for foods containing saccharin; and FDA document (dated 1 Dec. 1977) Aflatoxin contamination of milk. This document announces the establishment of an action level of 0.5 parts/billion for aflatoxin contamination of fluid milk products. VJG

12

[Grain and cereals. Determination of aflatoxins.]
Colombia, Instituto Colombiano de Normas Tecnicas
Colombian Standard ICONTEC 1232, 5pp. (1978) [Es] [Apartado Aereo 14 237, Bogota 2, Colombia]

A procedure is described for detn. of aflatoxins B_1, B_2, G_1 and G_2 in cereals, oilseeds, nuts, fruit products and animal feeds, based on extraction of aflatoxins with acetone, clean-up and concn. of the extract, separation by TLC on silica gel using a 90:10 chloroform/acetone solvent system, and detn. of aflatoxin concn. in the flecks on the developed chromatogram by UV densitometry. AJDW

13

Aflatoxins: chemical and biological aspects. [Book]
Heathcote, J. G.; Hibbert, J. R.
ix + 212pp. ISBN 0-444-41686-2 (1978) [many ref. En]
Amsterdam, Netherlands; Elsevier Scientific Publishing Co. Price f120.00; $53.50 [Univ., Salford, UK]

This book constitutes vol. 1 in the series Developments in Food Science, and aims to give a comprehensive account of the chemistry and biology of aflatoxins, based on an extensive literature survey. The chapters are: The discovery of the aflatoxins (pp. 1–15, 94 ref.); Production of aflatoxins (pp. 16–29, 110 ref.); The chemistry of the aflatoxins (pp. 30–53, 59 ref.); The assay of aflatoxins (pp. 54–82, 141 ref.); Pathological effects (pp. 83–111, 188 ref.); Biochemical effects (pp. 112–130, 96 ref.); Metabolism (pp. 131–150, 98 ref.); Biosynthesis (pp. 151–172, 58 ref.); and Control of aflatoxins (pp. 173–188, 110 ref.). An appendix tabulates physico-chemical properties of aflatoxins and UV, IR and mass spectral data. A 6-pp. subject index and a 12-pp. author index are included. DIH

14

[Studies on the fluorescent compounds in fermented foods. V. The behaviour of fungi during miso and shoyu fermentation and aflatoxin inspection of commercial shoyu.]
Manabe, M.; Matsuura, S.
Report of the National Food Research Institute [Shokuryo Kenkyusho Kenkyu Hokoku] No. 34, 79–83 (1979) [9 ref. Ja, en] [Nat. Food Res. Inst., Min. of Agric., Forestry & Fisheries, Tokyo, Japan]

Effects of NaCl on the growth of fungi in koji culture were tested by culturing *Aspergillus flavus, A. parasiticus, A. versicolor, A. ochraceus, A. clavatus* and *Penicillium citreo-viride* (selected as mycotoxin producing fungi) and *A. oryzae* (as a useful food fermentation organism). After one wk at 30°C all the strains grew well in koji culture media containing 0–12% NaCl, but none grew in media containing $\geq 15\%$ NaCl. To test the possibility of mycotoxin production during fermentation of miso and shoyu, the growth of the fungi was investigated. Most of the fungi present were *A. oryzae*, and they were immediately inactivated in the fermentation mixtures due to the high salt levels, which seemed to rule out the possibility of mycotoxin contamination of the products. An inspection of 39 samples of commercial shoyu from various Japanese prefectures did not reveal a single instance of aflatoxin contamination. [From En summ.] JRR

15

Photo-destruction of aflatoxin in groundnut oil. (In *'Fats and oils in relation to food products and their preparations'* [see FSTA (1980) 12 2N67].) [Lecture]
Shantha, T.; Sreenivasamurthy, V.
p. 103 (1978) [En] [Cent. Food Tech. Res. Inst., Mysore-13, India]

The effect of sunlight, UV light and visible light on aflatoxin in groundnut oil was studied. It was found that sunlight can destroy 990 µg toxin in 30 ml oil in 15 min, whereas other sources of light require longer exposure time. Sunlight can also destroy aflatoxin equally well when the oil depth is 4 in. Destruction was associated with reduction in toxicity to albino rats, and a shift in the absorption peak to 28 mu [?]. AS

16

[Excretion of aflatoxin M_1 in milk and its occurrence in dairy products – a literature review.] Zur Ausscheidung von Aflatoxin M_1 in die Milch und dessen Vorkommen in Milch und Milchprodukten – eine Literaturübersicht. [Review]
Sieber, R.; Blanc, B.
Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 69 (4) 477–491 (1978) [73 ref. De, en, fr] [Eidgenössische Forschungsanstalt für Milchwirtschaft, Liebefeld-Bern, Switzerland]

This review discusses the biological properties of aflatoxin M_1 and compares literature data on the relationship between aflatoxin B_1 intake (in feed) and subsequent excretion of aflatoxin M_1 in milk of cows and ewes. The risks of aflatoxin contamination in various types of feedstuff are discussed (the risk being greatest in groundnut products), and regulations adopted in various countries to control the aflatoxin content of feedstuffs are mentioned, e.g. EEC regulations specify that concentrates for dairy cattle must not contain more than 20 µg aflatoxins/kg, and Swiss regulations prohibit the use of groundnut products with detectable aflatoxin levels for feeding dairy cattle. The final part of the review, dealing with the occurrence of aflatoxin M_1 in processed milk products, examines conflicting literature data concerning the effects of storage at various temp. and the effects of heat treatment, concentration, roller-drying and spray-drying on aflatoxin M_1 content of milk. Reported findings of aflatoxin M_1 in different types of dairy products (dried milks, yoghurt, and Camembert and other cheeses) are tabulated, with an indication of the detection limit of the method used in each case. ADL

17

[Moulds and mycotoxins.]
Nilsson, G.
Livsmedelsteknik 21 (2) 70–72 (1979) [Sv]

This survey of the situation in Sweden with regard to moulds and mycotoxins in foods covers methods of analysis and control, aflatoxin, ochratoxin, patulin and work in progress in Sweden on the topic. Results of analyses of foods carried out by the Swedish Food Authority (Statens Livsmedelsverk, SLV) are given briefly, showing proportions of samples of nuts, flour and dough (examined during 1973–1978) exceeding the Swedish legal limit (0.005 mg/kg) for aflatoxin; % of samples of grain, peas, beans and kidneys found positive for ochratoxin A; and % of samples of apple-based drinks, fruits, grain, peas and beans found positive for patulin. HBr

18

[Chromatographic method for determination of aflatoxins B and G and ochratoxin A in foods.]
Cirilli, G.; Cantafora, A.; Bonora, S.; Angeli, A. degli

Rivista della Societa Italiana di Scienza dell'Alimentazione 8 (3) 201–206 (1979) [19 ref. It] [Univ. Int. G. Galilei, Bologna, Italy]

A procedure for detn. of aflatoxins and ochratoxin A in foods is described, based on extraction with distilled water/acetone (3:10 v/v), filtration of the extract, evaporation of the solvent, dissolving the residue in chloroform/hexane (1:3 v/v), clean-up by column chromatography on silica gel (elution of aflatoxins with chloroform/methanol 96:4, elution of ochratoxin with benzene/acetic acid 90:10), and separation by TLC on silica gel, using a toluene/ethyl acetate/formic acid (60:32:8) solvent system. Mycotoxin flecks may be identified by UV fluorescence and determined by fluorodensitometry. Comparative trials on spiked samples of various foods showed the new method to agree well with the EEC method; recovery values of the new method were high and consistent. Detection limit was 0.005 p.p.m. for aflatoxin B_1, 0.010 p.p.m. for the other aflatoxins, and 0.020 for ochratoxin A. AJDW

19

Mycotoxins I and II. [Conference proceedings]
United States of America, American Oil Chemists Society
Journal of the American Oil Chemists' Society 56 (9) 783–829 (1979) [many ref. En]

Papers presented at the 69th meeting of the American Oil Chemists Society held at St. Louis, Missouri, are given, and include: The three eras of fungal toxin research, by L. Stoloff (pp. 784–788, 42 ref.); Field contamination of corn in South Georgia, by D. M. Wilson, W. W. McMillian & N. W. Widstrom (pp. 798–799, 18 ref.); Decontamination of corn containing aflatoxin by treatment with ammonia, by E. B. Bagley (pp. 808–811, 13 ref.); Zearalenone in cereal grains, by G. A. Bennett & O. L. Shotwell (pp. 812–819, 72 ref.); and Trichothecenes: natural occurrence and potential hazards, by S. V. Pathre & C. J. Mirocha (pp. 820–823, 47 ref.). A further 4 papers are abstracted separately in FSTA and are listed in the author index under **United States of America,** American Oil Chemists Society [Mycotoxins Symposium]. SP

20

Mycotoxins – their biosynthesis in fungi. [Conference proceedings]
United States of America, American Society for Microbiology
Journal of Food Protection **42** (10) 804–835 (1979) [many ref. En]

6 papers presented at a seminar held during the 78th Annual Meeting of the American Society for Microbiology, May, 1978, in Las Vegas, Nevada, USA, are published, following a general introduction, by D. P. Hsieh (p. 804, 9 ref.). The 6 titles are listed as follows. Aflatoxins and other bisfuranoids, by J. W. Bennett & L. S. Lee (pp. 805–809, 82 ref.). Patulin and related carcinogenic lactones, by G. M. Gaucher (pp. 810–814, 40 ref.). Ochratoxins – metabolites of combined pathways, by W. E. Huff & P. B. Hamilton (pp. 815–820, 25 ref.). Zearalenone biosynthesis, by C. J. Mirocha & S. V. Pathre (pp. 821–824, 11 ref.). Biosynthesis of the trichothecenes, by A. Çiegler (pp. 825–828, 26 ref.). Ergot alkaloids, by J. E. Robbers (pp. 829–835, 42 ref.). DIH

21

[Cell-culture assay for detection of mycotoxins. I. Investigations with pure toxins.] Ein Zellkulturtest für den Nachweis von Mykotoxinen. I. Untersuchungen an Reinsubstanzen.
Lompe, A.; Milczewski, K.-E. von
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 169 (4) 249–254 (1979) [40 ref. De, en] [Miles-Kalichemie GmbH + Co KG, Grosse Drakenburgerstr. 103, D-3070 Nienburg, Federal Republic of Germany]

For detection of mycotoxins by a biological assay cells were seeded in Microtiter-plates together with toxin. After 24 h and 6 days of culture cells were examined visually for cytocidal effects, growth inhibition, and morphological aberrations. 3 human and 2 porcine cell-lines were compared as to their reaction with 16 mycotoxins and 9 organic chemicals. Results indicate that sensitivity to toxins was partially dependent on type and origin of cells. This suggests the use of several selected cell-lines in parallel for testing of microbially derived food additives for possible contamination by mycotoxins. AS

22

Minicolumn screening methods for detecting aflatoxin: state of the art. [Lecture]
Romer, T. R.; Ghouri, N.; Boling, T. M.
Journal of the American Oil Chemists' Society 56 (9) 795–797 (1979) [15 ref. En] [Ralston Purina Co., Checkerboard Square, St Louis, Missouri 63188, USA]

The use of small chromatographic columns (minicolumns) for the detection of aflatoxin in food extracts was introduced in 1968. Since then many different analytical methods for aflatoxin which involve a minicolumn detection step have been developed. 4 of these have been adopted as official AOAC procedures. The advantages and disadvantages of the types of minicolumns together with a comparison of the minicolumn technique to TLC are discussed. [See FSTA (1980) 12 3C97.] AS

23

Sample preparation of some shelled treenuts and peanuts in a vertical cutter-mixer for mycotoxin analysis.
Francis, O. J., Jr.
Journal of the Association of Official Analytical Chemists 62 (5) 1182–1185 (1979) [5 ref. En] [FDA, 4298 Elysian Fields Avenue, New Orleans, Louisiana 70122, USA]

A procedure was devised for more rapid preparation of large samples of nutmeats (10–80 lb) for mycotoxin analysis without the use of grinding aids, by combining the grinding and mixing steps into one operation. Ease of cleaning equipment facilitates the preparation of several samples in a short time. The procedure was tested using shelled raw and roasted peanuts, and raw almonds, walnuts, and pecans. Reduction of particle size to pass a 20 mesh screen was attained using a 25 qt Hobart vertical cutter-mixer (VCM) equipped with standard serrated blades and a 40 qt VCM using either a standard serrated blade or a smooth-edge blade modified with sharp-edge notches to increase its cutting ability. Portions of ground composite were removed at various time intervals and particle sizes were measured. Original and check analyses of 12 naturally contaminated samples over a 3 yr period indicate that this procedure is practical and reproducible. AS

24

Accuracy of subsampling mill for granular materials.
Dickens, J. W.; Whitaker, T. B.; Monroe, R. J.; Weaver, J. N.
Journal of the American Oil Chemists' Society 56 (9) 842–844 (1979) [5 ref. En] [AR, SEA, USDA, Box 5906, Raleigh, N. Carolina 27650, USA]

A subsampling mill for simultaneous comminution and preparation of samples for aflatoxin analyses was constructed with 19 subsample spouts similar to the 1 or 2 subsample spouts on the conventional subsampling mills. Samples of groundnuts, each of which contained 1 kernel made radioactive by neutron activation, were comminuted in the mill. For treatment M the discharge from each spout was kept separate. For treatment R, the discharge from all 19 spouts was blended together in a twin-shelled blender and subdivided with a riffle divider into 16 subsamples which averaged the same wt. as the M subsamples. Radioactivity counts/g of each subsample were measured. 11 samples were comminuted for each treatment which produced a total of 209 M samples and 176 R samples. An analysis of variance on the pooled data from each treatment showed a mean square error of 1318.3 for the M treatment and 1278.6 for the R treatment. The null hypothesis that the mean square errors for the 2 treatments are equal was not rejected by the F test ($P = 0.421$). AS

25

Production of aflatoxin in cocoa beans.
Lenovich, L. M.; Hurst, W. J.
Journal of the Association of Official Analytical Chemists 62 (5) 1076–1079 (1979) [22 ref. En] [Hershey Foods Corp., Res. Lab., PO Box 54, Hershey, Pennsylvania 17033, USA]

Aflatoxin was produced in both non-autoclaved and autoclaved Ivory Coast cocoa beans inoculated, with *Aspergillus parasiticus* NRRL 2999 under optimum laboratory growth conditions. Total aflatoxin levels ranged from 213 to 5597 ng/g substrate. Aflatoxin was quantitated by using HPLC. Raw, non-autoclaved cocoa beans, also inoculated with aspergilli, produced 6359 ng aflatoxin/g substrate. Variation in aflatoxin production between bean var. was observed. Total aflatoxin levels of 10 466 and 23 076 ng/g substrate were obtained on Ivory Coast beans inoculated with *A. parasiticus* NRRL 2999 and NRRL 3240, resp. Aflatoxin production on Trinidad and Malaysian beans was 28 and 65 ng aflatoxin/g substrate. These data support previously reported low level natural aflatoxin contamination in cocoa. AS

26

Aflatoxin variation among corn samples with varying ratios of *Aspergillus flavus*-inoculated/noninoculated kernels.
Lillehoj, E. B.; Calvert, O. H.; Kwolek, W. F.; Zuber, M. S.
Journal of the Association of Official Analytical Chemists 62 (5) 1083–1086 (1979) [9 ref. En] [USDA, N. Reg. Res. Cent., Agric. Res., Sci. & Education Administration, Peoria, Illinois 61604, USA]

Aflatoxin levels and physical properties of corn kernels inoculated with *Aspergillus flavus* during development and noninoculated kernels were compared in samples with various proportions of the 2 kernel types. The relationship between mean toxin levels and associated s.d. of 5 samples demonstrated a linear association from the lowest toxin in noninoculated corn through a mixture of 60% inoculated/40% noninoculated. However, at the highest toxin level in the 100% inoculated material, a reduction in sample variation was observed. Examination of individual kernel wt. showed that inoculated kernels were distinctly lighter than noninoculated seed. A uniform grinding procedure of the samples yielded heterogeneous particle sizes, with distribution depending on starting corn. The large particle fraction (>500 μm) decreased from 100% noninoculated kernels through the mixtures to the 100% inoculated seed; particles <150 μm were most abundant in the ground samples from inoculated kernels. In addition, the density of particles within a size category varied; lower densities were observed in samples obtained from *A. flavus*-inoculated kernels. AS

27

Minicolumn detection methods for aflatoxin in yellow corn: collaborative study.
Shannon, G. M.; Shotwell, O. L.
Journal of the Association of Official Analytical Chemists 62 (5) 1070–1075 (1979) [6 ref. En] [USDA, N. Reg. Res. Cent., Agric. Res., Sci. & Education Administration, Peoria, Illinois 61604, USA]

The CPC modified method, the Holaday modified method, and the combination of the 2 procedures were compared. The CPC modified method involves more cleanup steps but has a more sensitive column. The Holaday modified procedure has fewer cleanup steps, but the column is more difficult to interpret. The combination CPC-Holaday, which has proved to be the most satisfactory, combines the speed and simplicity of the Holaday extraction and the sensitivity of the Velasco minicolumn used in the CPC method. Levels of 10 ng/g were detected by 89% of the collaborating laboratories using the combination, Holaday-Velasco, method. The combination method has been adopted as official first action. AS

28

Variability associated with testing corn for aflatoxin. [Lecture]
Whitaker, T. B.; Dickens, J. W.; Monroe, R. J.
Journal of the American Oil Chemists' Society 56 (9)

789–794 (1979) [13 ref. En] [USDA, SEA, Weaver Lab., North Carolina State Univ., Raleigh, N. Carolina 27650, USA]

The sampling, subsampling (both coarse and fine ground meal), and analytical variances associated with testing shelled corn for aflatoxin were estimated by the use of 500 g samples, 50 g subsamples, and the AOAC Official First Action method of analysis. The magnitudes of the variance components increased with an increase in the aflatoxin concn. Functional relationships were developed to predict the variance for a given aflatoxin concn. and any size sample, subsample, and number of analyses. At 20 parts/billion total aflatoxin, the coeff. of variation associated with a 4.54 kg sample, 1 kg subsample of coarsely ground meals (passes a 14 screen) a 50 g subsample of finely ground meal (passes a 20 screen) and one analysis were 21, 8, 11 and 26%, resp. [See FSTA (1980) 12 3C97.] AS

29

On-column chromatographic extraction of aflatoxin M_1 from milk and determination by reversed phase high performance liquid chromatography.

Winterlin, W.; Hall, G.; Hsieh, D. P. H.

Analytical Chemistry 51 (11) 1873–1874 (1979) [12 ref. En] [Dep. of Environmental Toxicol., Univ. of California, Davis, California 95616, USA]

A simple and low-cost HPLC method is described, which is capable of detecting ≤ 0.1 µg aflatoxin M_1/kg milk; the complete analysis only takes about 20 min. The HPLC was performed using a Model 6000A pump, a U6K injector, and a model 420 fluorescence detector, all from Waters Associates, Milford, Massachusetts 01757, USA. Aflatoxins were separated from milk constituents by adding 10 ml milk (diluted with 15 ml water) to a column of Sep Pak. The column was washed with 20 ml of 10% acetonitrile in water, followed by elution of aflatoxin M_1 with 4 ml of 30% acetonitrile and direct injection of the eluate onto the HPLC. 8 samples of milk fortified with aflatoxin M_1 at 0.5 µg/kg resulted in a mean recovery of 95%. There were no detectable losses of aflatoxin M_1 in milk samples stored for 60 h at 7°C. Automation of the procedure is being investigated. MC

30

Radioimmunoassay of aflatoxin M_1.

Harder, W. O.; Chu, F. S.

Abstracts of the Annual Meeting of the American Society for Microbiology 79, 204 (1979) [En] [Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Antiserum against aflatoxin M_1 (AFM) was obtained from albino rabbits after immunization of the animals with a bovine serum albumin-AFM oxime conjugate. The antiserum has high binding efficiency with AFM but lesser efficiency with aflatoxin B_1 (AFB). Using [^{3}H] AFB, a radioimmunoassay (RIA) was developed. The method involves incubation of unknown sample with [^{3}H] AFB and AFM antiserum, followed by $(NH_4)_2SO_4$ precipitation, washing, and counting the radioactivity in the supernatant. A standard curve, in the range of 1–10 ng/assay, was established by using unlabelled pure AFM instead of unknown sample. Chloroform extracts from defatted whole milk can be used directly in the RIA of AFM with a sensitivity of 0.5–20 ng/ml. Simultaneous detection of AFB and AFM in milk can be achieved by a simple chromatographic procedure to separate AFB and AFM before RIA. AS

31

The rapid determination of aflatoxin M_1 in dairy products. [Lecture]

Stubblefield, R. D.

Journal of the American Oil Chemists' Society 56 (9) 800–802 (1979) [14 ref. En] [N. Reg. Res. Cent., USDA, Peoria, Illinois 61604, USA]

A method for aflatoxin M_1 in dairy products is presented. It decreases the analysis time compared to currently accepted methods. Samples are extracted in a blender or separatory funnel for 1 min with chloroform and saturated NaCl solution. The chloroform extracts are partially purified on a small silica gel column (2 g), and M_1 is determined by TLC and densitometry. Recoveries of M_1 added to milk are about 80%. Recovery of M_1 from cheeses is variable depending on the type of cheese. The method gave results for a naturally contaminated powdered milk comparable to analyses by accepted methods. The detn. limit of the method is about 0.1 µg/kg [See FSTA (1980) 12 3C97.] AS

32

Extraction, cleanup, and quantitative determination of aflatoxins B_1 and M_1 in beef liver.

Trucksess, M. W.; Stoloff, L.

Journal of the Association of Official Analytical Chemists 62 (5) 1080–1082 (1979) [5 ref. En] [FDA, Div. of Food Tech., Washington, DC 20204, USA]

A method for detn. of aflatoxin B_1 in eggs was applicable for aflatoxin B_1 in liver, but ineffective for aflatoxin M_1 in liver because of poor recovery of added aflatoxin and interferences in TLC. The method was modified by the addition on citric acid to the extracting solvent and ammonium sulphate to the extract solution for removing protein. The elution system for silica gel column cleanup was also changed by substituting methanol for acetone, and adding a step for confirmation of aflatoxin M_1 identity. The method has been used successfully for survey and research on aflatoxin residues in animal tissues. AS

33

Production of sclerotias by aflatoxigenic and nonaflatoxigenic strains of *Aspergillus flavus* and *A. parasiticus*.

Bennett, J. W.; Horowitz, P. C.

Mycologia 71 (2) 415–422 (1979) [21 ref. En] [Tulane Univ., New Orleans, Louisiana 70118, USA]

In view of previous reports suggesting that sclerotial strains of *A. flavus* and *A. parasiticus* may be high aflatoxin producers, 14 strains differing in aflatoxin- and sclerotium-producing ability were grown on various media. Sclerotium production varied with the strain. 4 strains produced no aflatoxin (including 1 high and 2 intermediate sclerotium producers, and 1 non-sclerotium producer). No correlation was observed between sclerotium production and toxigenicity among the 10 aflatoxigenic strains studied. RM

34

Cancer, mathematical models and aflatoxin.
Carlborg, F. W.
Food and Cosmetics Toxicology 17 (2) 159-166 (1979) [18 ref. En][Dep. of Statistics, Univ. of Chicago, Chicago, Illinois, USA]

A mathematical model (function) is fitted to the observed results from an animal experiment and used to extrapolate these results to much lower dose levels and to estimate the risk to man. Several mathematical models are evaluated with respect to aflatoxin. To discriminate between the models, an animal experiment, using male rats, and 5 doses of aflatoxin (0, 1, 5, 15, 50 and 100 parts/billion) was used. With each of the estimated models the daily dose of aflatoxin for human males corresponds to an overall 10^{-6} lifetime risk of cancer, or 1.5 cases/yr among USA males. VJG

35

[Elimination of aflatoxin B_1 from contaminated substrates by swelling clays.]
Masimango, N.; Remack, J.; Ramaut, J.
Annales de la Nutrition et de l'Alimentation 33 (1) 137-147 (1979) [8 ref. Fr, en][Univ. de Liege, Sart Tilman, B-4000 Liege, Belgium]

Adsorption of aflatoxin B_1 on various adsorbing clays was studied. Tabulated results show the adsorption and desorption of aflatoxin B_1 from Sorensen's buffer pH 6.5 onto 19 clays, adsorption from physiological saline, Czapek medium, Pilsen and Sorghum beer, full-cream and skim-milk onto 2 clays and effect of particle size, pre-treatment of clay at 650°C, length of contact, pH of the clay suspension, incubation temp. and clay concn. on adsorption of aflatoxin B_1. 93-100% of the toxin was adsorbed onto Bentonite S3 from beer and milk. Desorption was increased by fine grinding, reduced by heat treatment, and not affected by contact time (6-72 h). Adsorption on illite was less at pH 6.4 than at 5.8 or 7.0, but was not affected by pH on hectorite; it was not affected by incubation temp. of 30° or 15°C; on montmorillonite S28 adsorption rose from 92 to 100% at increasing clay concn. from 0.5 to 2.0 g/50 ml. Results suggest that adsorption can be a useful method of detoxication. RM

36

[Role of the mycelium in the elimination of aflatoxin B_1 from contaminated substrates.]
Masimango, N.; Remack, J.; Ramaut, J.
Annales de la Nutrition et de l'Alimentation 33 (1) 149-162 (1979) [many ref. Fr, en][Univ. de Liege, Sart Tilman, B-4000 Liege, Belgium]

When the toxigenic strain of *Aspergillus flavus* 14409 was grown in mixed culture with non-toxigenic strains on solid or liquid media, it produced less aflatoxin than in pure culture. It was shown that the mycelium of both toxigenic and non-toxigenic strains immobilized a large amount (>75%) of the toxin by adsorption onto its walls. More toxin was adsorbed when the mycelium was disintegrated. Potential application for detoxifying liquid substrates is suggested. [See also preceding abstr.] RM

37

Aflatoxin in the southeastern United States: was 1977 exceptional?
Cobb, W. Y.
Association of Food and Drug Officials, Quarterly Bulletin 43 (2) 99-107 (1979) [1 ref. En][Food & Drug Protection Div., N. Carolina Dep. of Agric., Raleigh, N. Carolina 27611, USA]

The regulatory action taken in 1977 as a result of detection of elevated aflatoxin levels in maize and maize products in North Carolina, USA are described. Levels of aflatoxins in other foods (market milk, meat and eggs) were also monitored. Of 302 milk samples, 19 exceeded the 0.5 parts/10^9 action guideline. Meat and eggs were not significantly affected by aflatoxin contamination. JRR

38

Relationship of mycotoxins to human diseases.
Hayes, A. W.
Abstracts of the Annual Meeting of the American Society for Microbiology 79, 31 (1979) [En][Univ. of Mississippi Med. Cent., Jackson, Mississippi, USA]

At least 9 human diseases have been suggested to involve mycotoxins in their aetiology. 3, hepatocellular carcinoma, Reye's syndrome and Balkan nephropathy, are discussed. Data suggest a link between aflatoxin and the first 2 whereas ochratoxin A or ochratoxin A + citrinin or an unknown *Aspergillus* toxin are possible aetiologic agents for Balkan nephropathy. Epidemiologic studies show a high correlation between injestion of aflatoxin-contaminated food and primary liver cancer. These data, coupled with the fact that aflatoxin is a potent carcinogen in animals, support its involvement in human liver cancer. Data also suggest the association of aflatoxin B_1 with Reye's syndrome, a disease of unknown aetiology which kills young children, in New Zealand, Czechoslovakia, Thailand and the USA. Although evidence supporting a mycotoxin aetiology for Balkan nephropathy, endemic to the Danube River basin of Romania, Bulgaria and Yugoslavia, is less convincing, the presence of ochratoxin A and a 2nd toxigenic fungus in plate samples suggests such an aetiology. In addition, clinical symptoms reported for avian and porcine mycotoxic nephropathy, induced by ochratoxin A and/or citrinin, resemble Balkan nephropathy. AS

39

Aflatoxins and the liver.
Cooper, P.
Food and Cosmetics Toxicology 17 (4) 408-409 (1979) [18 ref. En][British Ind. Biol. Res. Ass., Woodmansterne Rd., Carshalton, Surrey, UK]

Laboratory studies on the susceptibility of primates to acute toxicity and/or carcinogenic potential of aflatoxins are briefly reported. The possible association between Reye's syndrome and aflatoxin ingestion is considered. VJG

40

[Aflatoxin B_1-producing strain of *Aspergillus flavus* var. columnaris.]
Glinsukon, T.
Journal of the National Research Council of Thailand 11 (2) 17–26 (1979) [2 ref. Th, en] [Dep. of Physiol., Fac. of Sci., Mahidol Univ., Philippines]

An aflatoxin B_1-producing strain of *Aspergillus flavus* var. *columnaris* isolated from prepared infant food has been identified. On Czapek's solution (3% and 20% sucrose), malt extract and M40 Y agar, the strain is characterized by yellowish green conidial heads with uniseriate sterigmata bearing long conidial chains in the shape of loose columns with smooth to fine echinulate globose conidia. The aerial conidial heads are also produced on malt extract and M40 Y agar at 25°C, and on Czapek's solution agar (3% sucrose) at 37°C. Colonies on Czapek's solution agar (20% sucrose) grow at a moderate rate to 4.9–5.2 cm at 25°C in 10 days and rapidly in Czapek's solution agar (3% sucrose) to 7.3–7.5 cm, on malt extract agar to 8.4–8.5 cm and M40 Y to 9.0 cm (overgrowth) at 25°C in 10 days. Incubation at higher temp. (37°C) on Czapek's solution agar (3% sucrose) has no effect on the growth rate (5.2–5.6 cm). This strain of *A. flavus columnaris* produces aflatoxins B_1 and B_2 at higher quantities of 6415 p.p.b. (parts/billion) and 2321 p.p.b. on peanuts and 4851 and 1124 p.p.b. resp. on corn at 25°C in 14 days. Aflatoxins G_1 and G_2 are not detected on these substrates. UPLB

41

[Aflatoxins in preparation of malt and beer.]
Aflatoxine in der Malz- und Bierbereitung.
Steiner, K.; Länzlinger, U.
Brauerei-Rundschau 89 (8) 133–135 (1978) [7 ref. De] [Brauerei A. Hürlimann AG, Zürich, Switzerland]

Possible contamination of commercial malt samples with aflatoxins, formation of aflatoxin during malting, and carry over of aflatoxin into beer were studied. A technique based on extraction of whole grains with chloroform, concentration, and TLC, was developed for detection of aflatoxins in commercial malts. No aflatoxin was detected in 41 samples analysed, at a detection limit of 0.1 ng/kg malt. Formation of aflatoxin during malting was studied using an aflatoxigenic strain of *Aspergillus flavus* added to barley with the steep water. Aflatoxin contents after malting for 5 days at 20°C were: B_1 1–2.5 ng/100 g malt, G_1 0.1–1 ng/100 g. This showed that aflatoxin formation during malting was possible if barley was contaminated with aflatoxigenic mould. Brewing studies during which aflatoxins were added at mashing showed that 10% of added aflatoxins G_1 and G_2 and 5% of added aflatoxins B_1 and B_2 were recoverable from beer. Details of the brewing/extraction/TLC detection procedure are given. DIH

42

Comparative study of two methods for extraction of aflatoxin from peanut meal and peanut butter.
Chang, H. H. L.; Vries, J. W. de; Hobbs, W. E.
Journal of the Association of Official Analytical Chemists 62 (6) 1281–1284 (1979) [6 ref. En] [General Mills, Inc., James Ford Bell Tech. Cent., 9000 Plymouth Ave N, Minneapolis, Minnesota 55427, USA]

The efficiencies of extraction of aflatoxins of the 2 official AOAC methods for detn. of aflatoxins in peanut products, i.e. the CB and Best Foods methods [see Official Methods of Analysis (1975) 12th Ed., AOAC, Arlington, Virginia, USA] were compared. Naturally contaminated peanut meals (4) and peanut butters (6) were extracted by 2 methods, and aflatoxins were quantitated by TLC and reversed phase HPLC. Mean contents across the 10 samples for the CB and Best Foods methods were (µg/kg): aflatoxin B_1, 404.17, 239.05; B_2, 116.71, 52.77; G_1, 5.69, 4.22; and G_2, 1.11, 0.91, resp. CB results were higher than Best Foods results by 60% for B_1, 121% for B_2, 35% for G_1 and 22% for G_2. These figures become 79% for B_1 and 64% for B_2 if 1 sample (having very high B_1 and B_2 contents) is excluded. DIH

43

Aflatoxin B_1 in barley in the UK. [Letter]
Hacking, A.; Biggs, N. R.
Nature, UK 282 (5735) 128 (1979) [En] [Welsh Office, Aberystwyth, UK]

Isolation of a strain of *Aspergillus flavus* from mouldy barley grown in the UK, and detection of 125 µg aflatoxin B_1/kg barley in the sample are reported. Aflatoxin B_1 has not previously been detected in UK-grown cereals. Significance of an application of propionic acid to the barley (below recommended level) is to be further investigated. DIH

44

[Role of chemical additives in anti-aflatoxin control.]
Masimango, N.; Ramaut, J. L.; Remacle, J.
Revue des Fermentations et des Industries Alimentaires 33 (4) 116–123 (1978) [11 ref. Fr, en, nl] [Dep. de Bot., Lab. de Bot. Phamaceutique & d'Ecologie Microbienne, Univ. de Liege, Sart-Tilman, B-4000 Liege, Belgium]

43 chemical inhibitors (listed) were tested for inhibition of mycelium development and aflatoxin (AF) production by *Aspergillus flavus* in maize flour, using inhibitor concn. of 1.0, 0.5 and 0.1%. Maize flours with additive and also controls inoculated with *Asp. flavus* were incubated for 7 days at 30°C, and AF was then extracted and determined; AF $<50\%$ of control content was considered positive inhibition. AF reductions, tabulated for each additive, combined with legal regulations, limited the final choice to 0.5% concn. of sorbic acid (SA), potassium sorbate (KS) or sodium metabisulphite (NaM). In water, NaM produces $Na_2SO_3 + SO_2$, giving rise to a possible legal complication, although only 11% of the Na_2SO_3 remained after cooking. Flours were also inoculated and adjusted to moisture contents from 1.0 to 21%, and treated with NaM. AF inhibition was improved by increasing NaM concn. and low moisture contents. Inhibition was higher with 0.1% NaM at 15° than at 30°C, with no difference at 0,5 or 1.0% concn. Over a period of 10–60 days at 30°C, inhibition was best with 1% NaM up to 30 days, and with 1% SA or KS for longer periods. Effect of pH varied between additives. AF formation depended mainly on level of mycelium production. ELC

45

Rapid and simple determination of aflatoxin M_1 in milk in the low parts per 10^{12} range.
Gauch, R.; Leuenberger, U.; Baumgartner, E.
Journal of Chromatography 178 (2) 543–549 (1979) [17 ref. En] [Kantonales Lab., PO Box, CH-3000 Bern 9, Switzerland]

Raw milk (50 ml) is treated with 0.4 ml 25% HCl + 15 ml methanol, heated for 15 min at 50°C and filtered. 20 ml filtrate is pipetted directly onto an Extrelut clean-up column, and aflatoxin M_1 eluted with 200 ml dichloromethane/toluene (4:1). The eluate is washed twice with 15 ml 0.01N NaOH (rapidly because of the labile nature of aflatoxin M_1 under alkaline conditons) and once with 15 ml 0.1N HCl, and evaporated to dryness prior to TLC analysis. The silica gel plates are developed with chloroform/acetone (9:1) and then (in the same direction) with dichloromethane/acetone (6:4). Quantitative measurements are made by fluorimetry (excitation at 365 nm, emission at 420 nm), a linear response being obtained with concn. of aflatoxin M_1 >100 parts/10^{12}. Recovery of aflatoxin M_1, from milk fortified with 50 parts/10^{12} was 78 ± 4% with the Extrelut clean-up vs. 90 ± 3% with the conventional procedure. Detection limit was 5 parts/10^{12} for both clean-up methods. The ease and speed of the Extrelut clean-up prior to TLC makes this method more convenient than an extended clean-up combined with HPLC. Dried milk can also be analysed by the above procedure except that the reconstituted sample is treated with 0.2 ml (instead of 0.4 ml) 25% HCl to obtain a pH of 4.6. MEG

46

The 'carry-over' of aflatoxin, ochratoxin and zearalenone from naturally contaminated feed to tissues, urine and milk of dairy cows.
Shreeve, B. J.; Patterson, D. S. P.; Roberts, B. A.
Food and Cosmetics Toxicology 17 (2) 151–152 (1979) [8 ref. En] [Cent. Vet. Lab., Weybridge, Surrey KT15 3NB, UK]

Concentrate rations containing 385–1925 µg zearalenone/kg or 317–1125 µg ochratoxin A/kg were prepared from naturally moulded wheat and barley, and were fed to 2 adult Jersey milking cows (individually 10 kg daily), the zearalenone ration for 7 wk and the ochratoxin ration for 11 wk before slaughter. All batches of both mixes were found to contain aflatoxin B_1 at a concn. of 20 µg/kg. Milk yield was recorded daily and milk samples were collected during the last wk of the feeding period. There was no obvious effect on milk yields. Residues of zearalenone, ochratoxin α and aflatoxin B_1 were not detected in muscle, liver, kidney, serum, milk or urine, but ochratoxin A was detected in the kidneys of 1 cow at a concn. of about 5 µg/kg and aflatoxin M_1 was detected in the kidneys, urine and milk of all animals at concn. varying from trace amounts to 0.6 µg/kg. VJG

47

Inhibitory effects of spices on the growth and toxin production of toxigenic fungi.
Hitokoto, H.; Morozumi, S.; Wauke, T.; Sakai, S.
Abstracts of the Annual Meeting of the American Society for Microbiology 79, 204 (1979) [En] [Tokyo Metropolitan Res. Lab. of Public Health, Tokyo]

Inhibitory effects of 38 kinds of commercial powdered spices on growth and toxin production of *Aspergillus flavus* and *A. versicolor* were observed by introducing these substances into culture media for mycotoxin production. Of the 38 samples tested, cloves, star anise seeds, and allspice completely inhibited fungal growth, while the others only inhibited toxin production. The extracts from cloves and thyme completely inhibited the growth of both *A. flavus* and *A. versicolor* at 0.4 mg/ml or below. At a concn. of 2 mg/ml, extracts from star anise seeds showed inhibitory effect on growth of the strains. AS

48

[Qualitative and quantitative determination of two 12–13 epoxytrichothecenes (T_2 toxin and diacetoxyscirpenol) by GLC.]
Milama, N.; Lelieure, H.
Analusis 7 (5) 232–235 (1979) [10 ref. Fr, en] [Inst. de Recherches sur le Cancer, 7 rue Guy-Moquet, F-94800 Villejui, France]

GLC methods were developed for detn. of 2 toxic metabolites of some microscopic fungi including food contaminants (i.e. *Fusarium, Trichothecium, Trichoderma, Myrothecium* and *Stachybotrys* sp.), T_2 toxin and diacetoxyscirpenol (DAS). Limits of detection for T_2 toxin and DAS, resp., are 250 and 150 parts/billion (p.p.b.) by flame ionization detection of trimethylsilyl derivatives, and 0.9 and 0.3 p.p.b. by electron capture detector with heptafluorobutyryl imidazole derivatives. More information on these and other toxins could be obtained by alkaline hydrolysis prior to derivatization. RM

49

[Food hygienic aspects of the confectionery industry.]
Hopko, I.
Edesipar 30 (1) 8–13 (1979) [4 ref. Hu, de]

The microflora of confectionery products, such as sweets, jellies, sweetmeats, marzipans, nougats, chocolates, biscuits, wafers and lipid-rich products, consists mainly of aerobic sporeforming bacilli (e.g *Bacillus subtilis, B. cereus*) and fungi (e.g. *Penicillium* and *Aspergillus* spp.). The main factors affecting the microflora are storage temp. and RH. In groundnut-containing products aflatoxin may be present. Among the 8 aflatoxins produced by *Aspergillus flavus*, aflatoxin B_1 is the most toxic (10 mg daily may cause serious liver damage). The other commonly occurring mycotoxins are also tabulated. The most obvious changes during unfavourable storage are rancidity, fermentation, crystallization and surface cracking. For confectionery storage, the optimum temp. is about 16–18°C without sudden changes. The RH of the air of the storage place should be close to the equilibrium RH of stored products. The hygienic control of confectionery production and transport is discussed in detail. ESK

50

Severe occurrence of aflatoxin in the 1977 corn crop of North Carolina.
Hamilton, P. B.
Abstracts of the Annual Meeting of the American Society for Microbiology 79, 206 (1979) [En] [N. Carolina State Univ., Raleigh, N. Carolina 27607, USA]

2 independent statistically designed surveys of the 1977 corn crop of N. Carolina in which an estimated 47% of the total crop was liable to sampling revealed a mean aflatoxin concn. of 46.3 parts/billion with almost half the samples (48% and 44% in the 2 surveys) containing aflatoxin. Economic loss to growers and handlers was estimated at $31 800 000. Aflatoxin occurrence was associated in a highly significant fashion with drought stress (1 bushel/acre drop in yield meant 3% increase in aflatoxin level) and delay between harvest and drying (2% rise in aflatoxin per hour of delay). Corn earworm and corn borer damage, leaning stalks, contact between ear and soil or weed canopy, and mouldy ears but not other insects, corn var., nor use of insecticides, fungicides or herbicides were associated with aflatoxin occurrence. Aflatoxin concn. decreased from the W. to the E. portion and from the S. to the N. portion of the state as did the severity of the drought. AS

51

Evidence that fungal interactions influence aflatoxin levels in corn.
Wicklow, D. T.; Hesseltine, C. W.; Shotwell, O. L.; Adams, G. L.
Abstracts of the Annual Meeting of the American Society for Microbiology 79, 202 (1979) [En] [N. Reg. Res. Cent., USDA, Peoria, Illinois, USA]

Evidence is presented that aflatoxin levels in individual corn kernels colonized by *Aspergillus flavus* can be greatly affected by the activities of co-occurring microfungal spp. Thirteen prevalent spp. of microfungi isolated from aflatoxin-contaminated corn sampled at harvest were examined for their ability to influence aflatoxin production when co-inoculated with *A. flavus* (NRRL 6412) onto autoclaved aflatoxin-free corn kernels. The status of individual fungal colonists as interference competitors, and the order in which these colonists became established within the kernel (i.e., before, during, or after colonization by *A. flavus*), was important in explaining variation in aflatoxin levels. AS

52

Destruction of aflatoxin in rice by different cooking methods.
Fasiha Rehana; Basappa, S. C.; Murthy, V. S.
Journal of Food Science and Technology, India 16 (3) 111–112 (1979) [9 ref. En] [Cent. Food Tech. Res. Inst., Mysore-570 013, India]

Rice naturally infested with aflatoxin-B_1-producing moulds, and rice samples to which aflatoxin-containing mouldy rice was added or rice samples to which aflatoxin B_1 had been added were subjected to normal cooking for 30 min, cooking with excess water (25 g rice with 200 ml water) or pressure cooking (15 lb/in^2 gauge for 5 min). Initial aflatoxin content of the rice ranged from 0.02 to 4.00 p.p.m. in various samples. Normal cooking destroyed 49% of aflatoxin. Pressure cooking and cooking with excess water destroyed 73 and 81.6% aflatoxin, resp. Pressure cooking of rice seems to be an effective measure for reducing aflatoxin content.
CFTRI

53

Distribution of aflatoxin B_1 and M_1 in contaminated calf and pig livers.
Stoloff, L.; Trucksess, M. W.
Journal of the Association of Official Analytical Chemists 62 (6) 1361–1362 (1979) [9 ref. En] [Div. of Food Tech., FDA, Washington, DC 20204, USA]

Detn. of aflatoxins B_1 and M_1 in multiple sections of livers from 4 calves and 1 pig exposed to high levels of aflatoxins showed a uniform distribution of the aflatoxins in each liver, within the precision of the analytical method used. The TLC method has an expected within-laboratory coeff. of variation of 15%.
AS

54

Aflatoxin residues in the tissues of pigs fed a contaminated diet.
Furtado, R. M.; Pearson, A. M.; Hogberg, M. G.; Miller, E. R.
Journal of Agricultural and Food Chemistry 27 (6) 1351–1354 (1979) [22 ref. En] [Dep. of Food Sci & Human Nutr., Michigan State Univ., East Lansing, Michigan 48824, USA]

Pigs fed aflatoxins for 21 days had 36% heavier livers, gained 25% less wt., and ate 18% less feed than controls, but did not differ in efficiency of feed utilization or show any gross pathological lesions on postmortem examination. Assay of liver, heart, kidney spleen, and muscle showed some carry-over of aflatoxins B_1 and B_2 to all tissues, but G_1 and G_2 were not present. Residues of B_1 metabolites, M_1 and B_{2a}, were also found in all tissues of the pigs fed aflatoxins. This is the first time that B_{2a} has been identified as a tissue in the pig. Average retention of the aflatoxin dosage was calculated to be 0.015 and 0.005% for B_1 and B_2, resp. AS

55

[Contribution to objective aflatoxin determination.]
Jodral Villarejo, M.; Herrera Marteache, A.
Anales de Bromatologia 31 (1) 7–10 (1979) [17 ref. Es, en] [Univ. de Cordoba, Cordoba, Spain]

Equations were obtained for regression lines for aflatoxins B, G and M; and aflatoxins were determined quantitatively by TLC and UV densitometry, without using a standard. This new system of objective detn. allowed detection of 0.001 μg of aflatoxins B and G/g and 0.001 μg of aflatoxin M/l. RM

56

Toxicity and mutagenicity of molds of the *Aspergillus glaucus* group. Identification of physcion and three related anthraquinones as main toxic

constituents from *Aspergillus chevalieri*.
Bachmann, M.; Lüthy, J.; Schlatter, C.
Journal of Agricultural and Food Chemistry 27 (6) 1342–1347 (1979) [36 ref. En] [Swiss Federal Inst. of Tech. & Univ. of Zurich, Schorenstrasse 16, 8603 Schwerzenbach, Switzerland]

57

[Biological testing using the brine shrimp. II. The synergistic effects of mycotoxins to brine shrimp.]
Tanaka, K.; Manabe, M.; Matsuura, S.
Report of the National Food Research Institute [Shokuryo Kenkyusho Kenkyu Hokoku] No. 34, 84–88 (1979) [6 ref. Ja, en] [Nat. Food Res. Inst., Min. of Agric., Forestry & Fisheries, Tokyo, Japan]

The synergistic effects of mycotoxins to brine shrimp were examined. (i) Aflatoxin B_1, (ii) diacetoxyscirpenol, (iii) fusarenon-X, (iv) ochratoxin A, (v) sterigmatocystin and (vi) T-2 toxin were used as the mycotoxins. The mycotoxins were classified into 3 groups on the basis of the shape of the bioassay curve (48 h mortality vs. concn.). It is hypothesized that if half the median tolerance limit (TL_m) of 2 of the toxins should produce a mortality of $>60\%$, then this can be taken to be evidence of a synergism between them. By this criterion, a synergistic effect was observed between (iii) and (iv), but toxicities of other pairs were found to be merely additive. [From En summ.] [See FSTA (1976) 8 1A7 for part I.] JRR

58

[Mass spectrometry with the aid of direct introduction to detect aflatoxins in the nanogram region.] Massenspektrometrie mit Hilfe des Direkteinlasses: Aflatoxine im Nanogrammbereich.
Friedli, F.; Zimmerli, B.
Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 70 (4) 464–475 (1979) [19 ref. De, en, fr] [Abteilung Lebensmittelkontrolle, Bundesamt für Gesundheitswesen, Haslerstrasse 16, CH-3008 Bern, Switzerland]

'Off-line' introduction of small quantities (5–10 ng) of sample into MS by means of microcrucibles was investigated, to optimise conditions for detection of aflatoxins. The best material for the microcrucible was silanized quartz glass. Detn. with standard solutions of aflatoxins B_1, B_2, G_1, G_2, M_1 and M_2 showed a limit of detection of approx. 100 pg for a single aflatoxin. Mixtures of aflatoxins could be analysed (if the aflatoxin fraction were sufficiently purified) using 8-channel single ion monitoring. Problems introduced by the original food matrix are illustrated with reference to a dried milk containing aflatoxin M_1. Contaminants still present after HPLC purification of the aflatoxin fraction gave rise to a mass spectrum of unexpected shape, and greatly increased the total ion current, over what was expected from fluorescence measurements. Presence of contaminants also greatly reduced the expected evaporation temp. Presence of aflatoxin M_1 could be established after a simple purification of the sample, i.e. evaporation to dryness and solution of the residue in methanol/water (1:2). MS conditions and manipulations are described in detail. DIH

59

[Analytical results of aflatoxins in commercial foods.]
Naoi, Y.; Nishijima, M.; Ogawa, H.; Saito, K.; Kan, K.; Kamimura, H.; Ibe, A.; Ochiai, S.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] 20 (1) 54–58 (1979) [5 ref. Ja] [Tokyo Metropolitan Res. Lab. of Public Health, Hyakunin-cho 3-chome, Shinjuku-ku, Tokyo, Japan]

A survey for aflatoxins in foods was performed for 2175 samples from 1971 to 1977. Aflatoxins were detected in 2% of the samples at concn. of 0.2–495 parts/billion. For each of 6 types of foods, the numbers of aflatoxin-positive samples were as follows: 32 of 832 peanuts, 0 of 139 corns, 3 of 403 nuts (almond + pistachio), 9 of 206 beans containing CN glycoside, 0 of 169 other beans, and 0 of 426 others. Imported beans and peanuts were most likely to be contaminated with aflatoxins. For the analysis, the Japanese official method was applied with minor improvements. TM

60

Protocols for surveys, sampling, post-collection handling, and analysis of grain samples involved in mycotoxin problems.
Davis, N. D.; Dickens, J. W.; Freie, R. L.; Hamilton, P. B.; Shotwell, O. L.; Wyllie, T. D.
Journal of the Association of Official Analytical Chemists 63 (1) 95–102 (1980) [25 ref. En] [Auburn Univ., Auburn, Alabama 36830, USA]

This report examines and summarizes current knowledge regarding mycotoxin surveys, sampling techniques, conditions conducive to post-collection production of mycotoxins in grain samples, and analytical methods for mycotoxin analysis. Priority attention is given to samples of corn suspected of containing aflatoxin. The report includes recommendations where deemed appropriate by the Ad Hoc Work Group [to State Agricultural Experiment Stations – USDA Mycotoxin Research Coordinating Committee]. AS

61

Aflatoxin B_1 production in an eight-line diallel of *Zea mays* infected with *Aspergillus flavus*.
Zuber, M. S.; Calvert, O. H.; Kwolek, W. F.; Lillehoj, E. B.; Kang, M. S.
Phytopathology 68 (9) 1346–1349 (1978) [13 ref. En] [Dep. of Agronomy, Univ. of Missouri Agric. Exp. Sta., Columbia, Missouri 65201, USA]

In a field experiment 28 crosses of *Zea mays* corn were artificially infected with conidia of *Asp. flavus* combined with pulling back the ears and stabbing the kernels with pins. Production of aflatoxin B_1 was determined at maturity 30 days later by TLC. Results (tabulated) suggested that levels of aflatoxin B_1 production were under genetic control and that a cyclic selection programme should be effective in developing corn lines with resistance to aflatoxin contamination. Variability in aflatoxin levels found suggested that research is urgently needed on techniques of sampling and sample preparation. ELC

62

Aflatoxin in groundnut oil, groundnut cake and hydrogenated oil in Haput (Uttar Pradesh, India) market.
Ram Pal; Varma, B. K.; Srivastava, D. D.
Journal of Food Science and Technology, India 16 (4) 169–170 (1979) [8 ref. En] [Indian Grain Storage Inst., PO Box No.10, Hapur-245 101, Uttar Pradesh, India]

Aflatoxin contamination in (i) crude groundnut oil, (ii) refined groundnut oil, (iii) hydrogenated fat and (iv) groundnut cake marketed in Hapur, Uttar Pradesh, India was determined. (ii) and (iii) did not contain any aflatoxin. 66.7% of (i) and 70% of (iv) contained aflatoxin B in the range of 4.43–2660 parts/billion in (i) and 113.5–2250 parts/billion in (iv). CFTRI

63

Method for the estimation of aflatoxins B_1, and G_1, in animal tissue.
Malik, M. A.; Shah, M. A.; Ashgar, M. N.
Pakistan Journal of Scientific Research 31, 58–62 (1979) [21 ref. En] [Coll. of Vet. Sci., Lahore, Pakistan]

The method described consists of methanol extraction, chloroform purification, silica gel column chromatography clean-up and TLC detn. Application to ground beef muscle gave mean recoveries of 49 and 77%, resp. for aflatoxin B_1 and G_1, added at concn. of 0.3–0.7 µg/kg. RM

64

Hazards from nature. Aflatoxins.
Rodricks, J. V.
FDA Consumer 12 (4) 16–19 (1978) [En]

Aspects of the topic briefly considered are: detection methods; residues in foods; monitoring of susceptible products to keep aflatoxin-contaminated food off the market; establishment of a regulatory policy; and establishment of a lower tolerance level for aflatoxin in peanut products. VJG

65

Aflatoxin contamination in grains and grain products during the dry season in Guatemala.
Campos, M. de; Olszyna-Marzys, A. E.
Bulletin of Environmental Contamination and Toxicology 22 (3) 350–356 (1979) [17 ref. En] [Div. of Food Control & Analysis, Inst. of Nutr. of Central America & Panama (INCAP), Guatemala]

Samples were collected from the 3 zones (hot and humid north, hot and dry interior, and temperate and humid highlands) of Guatemala. 264 samples (some from the local market in Guatemala City and some from commercial samples of national and imported grain) were collected from different storage facilities. Whole grain samples were finely ground and immediate moisture detn. were made in about 50% of the samples. All the samples were analysed using the Romer method [see FSTA (1975) 7 11C419] with a few modifications. Results (positive samples, level of contamination, max. value, aflatoxins present) are tabulated, showing aflatoxin contamination in food and feed during the dry season. Samples analysed and number of positive samples, resp., were: white corn, 68, 7; yellow corn, 50, 7; corn meal, 13, 4; cottonseed meal, 14, 2; protein supplement meal, 19, 6; rice with bran, 18, 9; rice grain, 6, 2; black beans, 17, 1; other beans, 9, 0; peanuts grain, 10, 1; shell peanuts, 2, 1; peanut butter, 2, 0; mixed nuts, 1, 0; untoasted coffee beans 1, 1; and meat meal, 4, 1. No positive samples were found (number of samples examined in parentheses) for coffee pulp (1), coffee beans (1), wheat grain (3), wheat flour (7), red and white sorghum (7), sorghum flour (1), sesame seed (3), biscuits (2), cheese cake mix (1) and sugar (1). A high proportion of the 264 samples analysed were contaminated with aflatoxins (17%); 8% exceeded the 20 parts/billion level. The highest value (240 parts/billion) was found in a silo-stored yellow corn sample that came from a hot and humid area. Aflatoxin B_1 alone or in combination with other aflatoxins, was found in all the positive samples. Aflatoxin G_1 was found in corn, peanuts, rice, beans and meat meal, while aflatoxin G_2 was detected only in rice and beans. Highest incidence of contamination was found in samples coming from the hot and humid region. VJG

66

Proceedings of the Maryland Nutrition Conference for Feed Manufacturers, March 16–17, 1978.
[Conference proceedings]
United States of America, University of Maryland; United States of America, Maryland Feed Industry Council Incorporated; United States of America, American Feed Manufacturers Association
iv + 120pp. (1978) [many ref. En] Maryland, USA; University of Maryland. Price $1.50

Papers presented at the Maryland Poultry Nutrition Conference are given and include: The effects of ammoniated aflatoxin contaminated corn on domestic farm animals, by A. C. Keyl (pp. 11–18, 4 ref.) which discusses the possible transference of reaction products from the edible tissues of swine, cattle, poultry and eggs to human consumers. Calcium appetite in chickens, by W. J. Mueller, A. Pro-Martinez, I. G. Joshua & B. Lobaugh (pp. 82–87, 15 ref.) with data given for effects on egg wt. and shell thickness. The threatened status of growth promotants for livestock and poultry, by R. H. White-Stevens (pp. 87–101) which reviews effects of growth promotants on the human diets. Effects of monensin on performance and volatile fatty acids in ruminants, by E. C. Leffel (pp. 111–115, 21 ref.) with effects of monensin on carcass composition. SP

67

Postharvest pathology and mycotoxin contamination of Iranian pistachio nuts.
Mojtahedi, H.; Danesh, D.; Haghighi, B.; Barnett, R.
Phytopathology 68 (12) 1800–1804 (1978) [10 ref. En] [Inst. of Hort., Univ. of Isfahan, Iran]

Large variations between different yr have been found in the incidence of aflatoxines B_1 and B_2 (AF) in Iranian pistachio nuts. *Aspergillus flavus* infection increases with % open nuts; ripened nuts are 75–90% open and may remain on trees for 3 months before harvesting. Unripened, unopened nuts damaged by insects may also be contaminated. Further work is reported on the effects of processing and storage. Processing includes mechanical dehulling, washing in water and sun drying at RH 14–23% or hot air drying. *Asp. flavus* spores accumulated in the wash water (originally free) and increased the surface contamination of the nuts; air contamination was also higher in the premises than in outside air round the trees. Nevertheless, given immediate drying no AF was produced after 4 months at low RH. Surface sterilization of nuts with NaOCl had no effect on previous internal contamination in the field (considered to be the major factor) or on production of AF. Nuts infected by immersion in water containing 10^6 *Asp. flavus* spores/ml were stored at 20–25°C and RH of 25%, 65% and 100%. At 25% RH no AF was detected after 4 months: at 65% contamination was either nil or some early infection with no further increase. At 100% RH all nuts became contaminated, AF appeared after 6 days and increased progressively. The water content of nuts declines during ripening and AF formation is probably limited to periods of very high RH e.g. during rain. ELC

68

Aflatoxin B_1 and G_1 production in developing *Zea mays* kernels from mixed inocula of *Aspergillus flavus* and *A. parasiticus*.
Calvert, O. H.; Lillehoj, E. B.; Kwolek, W. F.; Zuber, M. S.
Phytopathology 68 (3) 501–506 (1978) [13 ref. En] [Dep. of Plant Path., Univ. of Missouri Agric. Exp. Sta., Columbia, Missouri 65201, USA]

In field experiments, 2 corn hybrids having either a thick or a thin pericarp were injured in 6 different ways with razor blades, pins or needles (to stimulate insect attack) and inoculated with conidial suspensions of (i) *Aspergillus flavus* and (ii) *Asp. parasiticus* using (i) and (ii) alone and mixtures of (i):(ii) of 75:25, 25:75 and 50:50, together with a control inoculum of water only. Ears were harvested 30 days after inoculation, shelled, dried and ground; aflatoxins B_1 and G_1 were determined in the ground corn by standard AOAC methods. Results are tabulated. Inoculations with the husks pulled back and kernels damaged produced significantly higher aflatoxin levels than with husks left intact: aflatoxin production was also much greater in hybrids with a thin pericarp. B_1 yields were relatively constant for all proportions of the 2 spp., but yields of G_1 (produced by (ii) only) were much lower with mixed spp. conidia than with (ii) alone. Results suggest that (ii) development is limited by (i) in mixtures on the same substrate. Some controls produced small amounts of aflatoxins, presumed due to natural infection. ELC

69

[Analytical method and investigation of natural occurrence of aflatoxins in dairy products.]
Saito, K.; Nishizima, M.; Kamimura, H.; Ibe, A.; Ochiai, S.; Naoi, Y.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] 20 (1) 27–32 (1979) [16 ref. Ja, en] [Tokyo Metropolitan Res. Lab. Public Health, Hyakunin-cho 3-chome, Shinjuku-ku, Tokyo, Japan]

An analytical method to determine aflatoxins in dairy products was studied. The AOAC method, which uses TLC, was improved using column chromatography on silica gel, with methanol/chloroform (3:97) as solvent, prior to TLC on silica gel with acetone/chloroform (1:9) as solvent for aflatoxins B_1, B_2, G_1 and G_2. The recoveries were 86, 99, 69, 89 and 102% for aflatoxins B_1, B_2, G_1, G_2 and M_1 added to dairy products. The method was applied to 113 samples of commercial modified dried milk, 16 of dried skim milk, 13 of raw cream, 56 of condensed milk and 83 of cheese; aflatoxin M_1 was detected in 17 samples of natural cheese at 0.2–1.3 μg/kg. TM

70

Aflatoxin B, effect on β-D-galactosidase in some starter cultures.
Phutela, R. P.; Kalra, M. S.
Acta Microbiologica Polonica 11 (3) 231–236 (1979) [14 ref. En] [Dep. of Microbiol., Punjab Agric. Univ., Ludhiana, India]

6 starter cultures were examined for ability to induce β-D-galactosidase activity in modified lactic broth. Max. enzyme activity (713×10^{-4} units/ml) was shown by *Lactobacillus bulgaricus*, and min. (140×10^{-4} units/ml) by *Streptomyces thermophilus [Streptococcus thermophilus]*. Max. inhibition of enzyme induction and activity in vitro by aflatoxin B was observed at 60 μg/ml culture in all cultures. However, enzyme induction was stimulated by aflatoxin B at 5–15 μg/ml in *Streptococcus lactis*, and by 5–20 μg/ml in *S. thermophilus*. JMa

71

Distribution, production, analysis and effects of aflatoxin in animal tissues and effects of scirpene toxins on chicken embryos.
Obioha, I. W.
Dissertation Abstracts International, B 40 (5) 2103–2104: Order no. 79-24259, 152pp. (1979) [En] [Iowa State Univ., Ames, Iowa 50010, USA]

Studies of the effects on 3-wk-old chickens of a single oral dose of 1 mg ^{14}C-labelled aflatoxin B_1 and on 6-wk-old chickens of a single oral dose of 10 mg unlabelled aflatoxins indicated that most of the aflatoxins were excreted in the faeces within 48 h and that of the aflatoxins retained most occurred in the liver. A further study involved inoculation of fresh pork sausage (containing 2.5% NaCl and either 156 or 200 p.p.m. $NaNO_2$) with *Aspergillus parasiticus* and incubation at 5, 26 or 37°C. No mould growth and no aflatoxin production were observed at 5°C. Mould growth and aflatoxin B_1 production were observed at 26° or 37°C, more aflatoxin being produced at the lower temp. A final study involved spreading *Asp. parasiticus* on Sabouraud glucose agar (containing 50, 156, 200 or 500 p.p.m. nitrite as $NaNO_2$) and incubating at 24°C. Examination after 4 days indicated more mould growth at the lower nitrite levels; storage for >4 days resulted in more mycelia and spore formation at the higher nitrite levels. JA

72

Levels of aflatoxins in the tissues of pigs fed contaminated rations. [Lecture]
Furtado, R. M.; Pearson, A. M.; Hogberg, M. G.;

Miller, E. R.
Journal of Animal Science 49 (suppl. 1) 220 (1979) [En] [Michigan State Univ., East Lansing, Michigan 48824, USA]

4 pigs were fed a diet spiked with aflatoxins B_1, B_2, G_1 and G_2 (0.61:0.20:0.26:0.26) at a level of 1.33 p.p.m. Compared with 4 control pigs not receiving aflatoxins, the experimental pigs showed feed intake reduced by 18%, gains by 25%, no gross lesions at slaughter but 36% heavier livers, measurable amounts of aflatoxins B_1, B_2 and M_1 in liver, heart, spleen, kidney and muscle, no G_1 or G_2 in any tissues, but B_{2a} present in all tissues (this is the first isolation of B_{2a} from animal tissues, but quantitation was not possible). [See FSTA (1980) 12 7S1061.] AL

73

[Commercial grains. Maize.]
Central America, Instituto Centroamericano de Investigacion y Tecnologia Industrial
Central American Standard **ICAITI 34 047,** 6pp. (1978) [Es] [Avenida La Reforma 4-47, Guatemala City, Guatemala]

This standard, superseding the standard of the same number issued in 1969, covers the following aspects: definition of the product; definition of quality-related terms; classification into 3 grades on the basis of colour (white, yellow, mixed); classification into 4 grades on the basis of texture; classification into 4 quality grades on the basis of moisture content, and proportions of damaged grains, infested grains and impurities; sampling; testing; and packaging. An appendix gives the max. tolerance for aflatoxins in maize in various maize-importing countries. AJDW

74

[Beans.]
Central America, Instituto Centroamericano de Investigacion y Tecnologia Industrial
Central American Standard **ICAITI 34 048,** 6pp. (1978) [Es] [Avenida La Reforma 4-47, Guatemala City, Guatemala]

This standard, which supersedes the standard of the same number issued in 1969, covers the following aspects: definition of the product; definition of quality-related terms; classification into 4 grades on the basis of colour; nomenclature; classification into 4 quality grades on the basis of moisture content, cooking time, and proportions of impurities or damaged or infested seeds; sampling; test methods; and packaging. An appendix gives max. tolerances for aflatoxins in beans in various importing countries. AJDW

75

[Non-polished and processed rice.]
Central America, Instituto Centroamericano de Investigacion y Tecnologia Industrial
Central American Standard **ICAITI 34 049,** 7pp. (1978) [Es] [Avenida La Reforma 4-47, Guatemala City, Guatemala]

This standard supersedes the standard of the same number issued in 1969. Aspects covered include: definition of the product, and quality-related terms; classification on the basis of grain size; classification into 4 quality grades each for non-polished and polished rice, on the basis of moisture content, and proportions of damaged and infested grain; nomenclature; sampling; test methods; and packaging. An appendix gives max. tolerances for aflatoxins in rice in various importing countries. AJDW

76

[Sorghum.]
Central America, Instituto Centroamericano de Investigacion y Tecnologia Industrial
Central American Standard **ICAITI 34 050,** 5pp. (1978) [Es] [Avenida La Reforma 4-47, Guatemala City, Guatemala]

This standard, which supersedes the standard of the same number issued in 1969, covers the following aspects: definition of quality-related terms; classification into 5 grades on the basis of grain colour; nomenclature; classification into 4 quality grades on the basis of proportions of impurities or damaged or infested grains; sampling; testing; and packaging. An appendix gives max. tolerances for aflatoxins in sorghum in various importing countries. AJDW

77

[Problems in establishing maximum permissible levels of carcinogenic substances in foods, using aflatoxins as example.] Zur Problematik der Festsetzung von Höchstmengen für carcinogene Stoffe in Lebensmitteln am Beispiel der Aflatoxine.
Mücke, W.; Schulze, H.
Zeitschrift für das Gesamte Lebensmittelrecht (ZLR) **7** (1) 19-31 (1980) [5 ref. De, en, fr]

A major problem in this area is whether limiting values for carcinogenic substances can be derived scientifically. The dogma of 'irreversibility of carcinogenesis' leads to the establishment of max. levels which are unworkable in practice. Hence the only practical way is to reach a figure somewhere between the limit of detectability and those concn. shown to be clearly carcinogenic in animal tests (with an adequate safety factor built in). Regulations on aflatoxins in foods are quoted as an example of max. levels reached by pragmatic methods. HBr

78

Aflatoxins role in the etiology of Reye's syndrome.
Cassidy, E. J.
EDRO SARAP Research Technical Reports 3 (June) 291-301: SARAP No. 56-74 (1978) [9 ref. En]

A retrospective epidemiological investigation of cases of Reye's syndrome was conducted. Interviews with members of Reye's patients' families and various examinations of food histories, food products with known potential for aflatoxin contamination, and potable water samples did not reveal an increased likelihood of a link between aflatoxin and Reye's syndrome. AL

79

[Determination of aflatoxins by high performance liquid chromatography with UV spectrophotometric and fluorometric detection.]
Blanc, M.
Annales des Falsifications et de l'Expertise Chimique 72 (778) 427–440 (1979) [8 ref. Fr] [Lab. Wolff, 198, Rue Sigmund-Freud, 75019 Paris, France]

3 methods of detection are described for detn. of aflatoxins in foods and dairy products by HPLC. UV spectrophotometric detection at 362 nm has a limit of detection of 5 ng for each of aflatoxins B, G and M. Fluorometric detection in liquid media is limited to aflatoxins B_2 and G_2, although prior derivatization of B_1 and G_1 with trifluoroacetic acid, followed by reverse phase chromatography permits fluorometric detection of the resulting B_{2a} and G_{2a} compounds. Sensitivity of the method is then 0.5 ng for aflatoxin B_1. A method permitting sensitive detection of aflatoxins B, G and M is fluorometry of aflatoxins adsorbed to silica: a special flow cell is constructed from a glass tube 10 mm in length × 2 mm internal diam. filled with 5 μm silica. Using a column eluent of dichloromethane/methanol (99.5:0.5), good separation and fluorescence of aflatoxins B and G are obtained; elution of the more polar aflatoxins M is achieved by increasing the methanol concn. from 0.5 to 5%. Limit of detection for aflatoxins B_1 and M_1 is 0.1 ng, equivalent to 0.3 pmol. This method can detect aflatoxin M_1 in dairy products at concn. as low as 0.05 ng/g. Speed and accuracy of the method are compared with TLC methods. DIH

80

Application of high-performance liquid chromatography to the analysis of aflatoxins in foods and feeds. Preparation of sample and column.
Goto, T.; Manabe, M.; Matsuura, S.
Agricultural and Biological Chemistry 43 (12) 2591–2592 (1979) [12 ref. En] [Nat. Food Res. Inst., Min. of Agric., Forestry & Fisheries, 2-1-2, Kannondai, Yatabe-cho, Ibaraki-ken, Japan 300-21]

Aflatoxins are extracted from complex foods or feeds with chloroform, and the chloroform extract is purified on an acidic alumina/silica gel/Na_2SO_4 column; impurities are washed from this column with benzene/acetic acid (9:1) then ether/hexane (3:1). Aflatoxins are eluted with methylene chloride/acetone (3:1). After concentration of the eluate to dryness, aflatoxins are dissolved in benzene/acetonitrile (98:2) for injection onto the HPLC column packed with silica gel AB-5. Detection is with a spectrofluorometer. Limit of detection for aflatoxin B_1 is 2 ng, and range for quantitive detn. was 0.01-4 p.p.m. DIH

81

Mold toxins: hazard to animal and human health.
Kobbe, B.
California Agriculture 33 (11/12) 18–19 (1979) [En]

82

Enhanced aflatoxin production by *Aspergillus flavus* and *Aspergillus parasiticus* after gamma irradiation of the spore inoculum.
Schindler, A. F.; Abadie, A. N.; Simpson, R. E.
Journal of Food Protection 43 (1) 7–9 (1980) [15 ref. En] [Div. of Microbiol., Bureau of Foods; Food & Drug Administration, Washington, DC 20204, USA]

Distilled water + 0.1% surfactant suspensions of spores of *A. flavus* and *A. parasiticus* were exposed to several radiation levels of ^{60}Co γ-rays. Spores of *A. flavus* isolate M-141 were exposed to radiation levels of approx. 16, 90 and 475 krads and inoculated onto a sterile rice substrate which was then monitored for aflatoxin production. In this initial trial with *A. flavus* M-141, aflatoxins B_1 and M production on rice increased as radiation dose increased. At the highest dose, this increase was > 50 × higher than non-irradiated controls. Spores of an aflatoxin G_1-producing *A. parasiticus* isolate, M-1094, were exposed to 90, 215 and 430 krads and resulted in increased production of aflatoxins G_1, B_1, and M. Aflatoxin production by M-1094 was highest at the low and medium dose levels. Irradiation of spores of this isolate with 430 krads produced no observable spore germination or growth on rice and no detectable aflatoxin after 1 wk of incubation at 27°C. Atypical colonies from irradiated spores were selected and their mycotoxin production was determined. Increase in aflatoxin production by these strains, as compared to non-irradiated controls, was 67:1 for aflatoxin B_1, 136:1 for B_2, and 138:1 for M. This potential for greatly increased mycotoxin production must be considered when food is irradiated or when a high production of aflatoxins is desired. AS

83

Confirmatory test for the high pressure liquid chromatographic determination of aflatoxin B_1.
Davis, N. D.; Diener, U. L.
Journal of the Association of Official Analytical Chemists 63 (1) 107–109 (1980) [11 ref. En] [Dep. of Bot. & Microbiol., Agric. Exp. Sta., Auburn Univ., Auburn, Alabama 36830, USA]

The iodine derivative of aflatoxin B_1 was determined by reverse phase HPLC with fluorescence detection. Aqueous solutions of aflatoxin B_1 were chromatographed on a Bondapak C_{18} column with methanol/water before and after treatment with iodine. A 4.5-min shift in retention time and a 25-fold increase in fluorescence resulted from the reaction. AS

84

Sampling and preparation of samples of peanut butter for aflatoxin analysis.
Waltking, A. E.
Journal of the Association of Official Analytical Chemists 63 (1) 103–106 (1980) [3 ref. En] [Best Foods Res. & Eng. Cent., CPC Int., Union, New Jersey 07083, USA]

Procedures are discussed for sampling peanut butter and preparing those samples for aflatoxin analysis. Special emphasis is placed on sampling the product from shipping pallets and comminuting chunk style peanut butter in order to reduce the variability in the analysis associated with the nonuniform distribution of aflatoxin in the product. The slurry method of preparation is a convenient means of obtaining a sample which is representative of a nonhomogeneous product. AS

85

[Presence of aflatoxins, sterigmatocystin and ochratoxin in green coffee beans.] (In '8th International Scientific Colloquium on Coffee' [see FSTA (1980) 12 8H1257].) [Lecture]
Palo, D. de; Gabucci, G.; Valussi, S.
pp. 539-543 (1979) [42 ref. Fr, en]

In the port of Trieste, during 1 yr, no mycotoxins could be detected in 502 samples of green coffee taken from cargos originating from different parts of the world (55% from Indonesia, 30% from Africa, 10% from Brazil, and 5% from other ports of South America) by using a new method for the detection of aflatoxins and sterigmatocystin. However, in samples taken from 6 stocks of unmarketable coffee of Central African origin, which had been stored in the warehouse for 2 yr, 12 mg sterigmatocystin/kg was detected in 1 sample. ESK

86

[Aflatoxins in Brazil nuts and pistachio nuts.]
Aflatoxine in Paranüssen und Pistazien.
Woller, R.; Majerus, P.
Lebensmittelchemie und Gerichtliche Chemie 33 (6) 115-116 (1979) [7 ref. De] [Chem. Untersuchungsamt Trier, Maximiner Acht 11a, 5500 Trier, Federal Republic of Germany]

TLC studies on aflatoxins in Brazil nuts and pistachio nuts are described. Studies on 135 samples of Brazil nuts (not sorted into mouldy and non-mouldy kernels) showed 78 to be free of aflatoxins, 29 to contain ≤ 5 μg aflatoxin B_1/kg and 28 to contain higher aflatoxin concn. (≤ 8000 μg/kg). Of 135 samples of non-mouldy nuts, only 1 contained aflatoxin (7 μg aflatoxin B_1/kg). Of 27 samples of mouldy Brazil nuts, 1 contained < 5 μg aflatoxin B_1/kg; the rest had higher aflatoxin concn., $\leq 47\,000$ μg aflatoxin B_1/kg and $\leq 103\,000$ μg total aflatoxin/kg. Of a total of 140 pistachio nut samples studied, 73 were free from aflatoxins, 40 had aflatoxin concn. < 5 μg/kg, and 27 had aflatoxin concn. above this value (≤ 35 μg aflatoxin B_1/kg). Of pistachio nuts from food shops, 16.7% contained aflatoxins (≤ 3.8 μg aflatoxin B_1/kg, ≤ 5.7 μg total aflatoxins/kg); of samples from butcher's shops (used in various meat products) 50% contained aflatoxins (≤ 22 μg aflatoxin B_1/kg, ≤ 45 μg total aflatoxin/kg). AJDW

87

Correlation between climatic data and aflatoxin contamination of Iranian pistachio nuts.
Danesh, D.; Mojtahedi, H.; Barnett, R.; Campbell, A.
Phytopathology 69 (7) 715-716 (1979) [6 ref. En] [Hort. Inst., Univ. of Isfahan, Isfahan, Iran]

Aflatoxin contamination of Iranian pistachio nuts imported into the USA has varied widely from yr to yr. Data are presented, with statistical analyses, for each yr from 1970 to 1974, showing the % shipments into the USA rejected (max. 76.9 in 1970, min. 0.1 in 1972) together with climatic data from Iran of rainfall, RH, temp., wind conditions for the whole yr and separately for the period Aug.-end of Nov. Correlations were observed between % rejctions and rainfall during Aug.-Nov., and possibly with wind conditions. During this time ripened nuts awaiting harvesting remain on the trees; the outer integuments split and render the nuts open to entry of airborne spores of *Aspergillus flavus*. However, germination and growth occur only during periods of actual rainfall (min. RH required is about 82%). ELC

88

[Commercial bran-containing foods. I. Composition and testing for aflatoxins.]
Cerutti, G.; Vecchio, A.; Finoli, C.; Chiribella, E.; Galkina Benelli, T.
Tecnologie Alimentari 3 (1) 17-23 (1979) [18 ref. It, en] [Cattedra di Residui & Additivi Alimentari, Univ. degli Studi, Milan, Italy]

Studies were conducted on the composition (moisture, ash, crude protein, ether extract, crude fibre (determined by the Weende and Bellucci methods), Na, K, Ca and Mg contents) of 82 samples of bran or bran-rich foods, including 16 samples of bran, 4 of rice, 7 of pasta, 12 of industrially-manufactured bread, 2 of bread made by small-scale bakeries, 12 of ship's biscuits, 8 of grissini (bread sticks), 13 of crackers, 5 of biscuits and 3 of rusks. Considerable variations in composition were observed, even within product types. No aflatoxin was detected in any sample. AJDW

89

Dairy products.
Ledford, R. A.
Special Report, New York State Agricultural Experiment Station No. 31, 10-12 (1979) [5 ref. En] [Dep. of Food Sci., Cornell Univ., Ithaca, New York, USA]

The problems caused by psychrotrophic organisms and their heat-resistant enzymes (lipases, proteases) during cold storage of liquid milk and dairy products, and of recontamination during packaging of pasteurized products are reviewed. A survey of commercial Cottage cheeses indicated that psychrotrophs are more important spoilage organisms than yeasts and moulds (counts of $> 65 \times 10^6$/g in 2 samples, vs. < 10 and 6900/g for yeast + moulds). Commercial samples of sour cream had low, insignificant counts of both groups of microorganisms. Aflatoxins in dairy products must be controlled by keeping aflatoxins out of animal feeds. RM

90

Conversion of aflatoxicol to aflatoxin B_1 in rats in vivo and in primary hepatocyte culture.
Wong, Z. A.; Decad, G. M.; Byard, J. L.; Hsieh, D. P. H.
Food and Cosmetics Toxicology 17 (5) 481-486 (1979) [36 ref. En] [Dep. of Environmental Toxicol., Univ. of

California, Davis, California 95616, USA]

Alfatoxin B_1 (a potent food borne carcinogenic mycotoxin) is known to be biotransformed by various animal spp. into several metabolites with different toxicological characteristics. The conversion of aflatoxicol to aflatoxin B_1 was studied under in vivo conditions and also in the primary hepatocyte cultures of the rat. Aflatoxicol showed a higher level of distribution to the tissues and a shorter plasma biological half-life, than aflatoxin B_1. The biological potency of aflatoxicol and the correlation of its formation with spp. sensitivity to the carcinogenic effect of aflatoxin B_1 may be due to its ability to undergo oxidation to the parent toxin, aflatoxin B_1, allowing further bioactivation. VJG

91

Survey for aflatoxins and zearalenone in canned and frozen sweet corn.

Stoloff, L.; Francis, O. J., Jr.

Journal of the Association of Official Analytical Chemists 63 (2) 180–181 (1980) [9 ref. En] [Div. of Food Tech., FDA, Washington, DC 20204, USA]

Aflatoxins and zearalenone were determined in 263 samples of canned or frozen sweet corn, collected from packing plants during the 1976 and 1977 packing seasons. As anticipated from geographic, agronomic, and microbiological considerations, no aflatoxin or zearalenone was found. Based on this sampling, the highest incidence of detectable aflatoxin that could be statistically anticipated in the major packing areas is 1.5%. AS

92

A fluorometric rapid screen method for aflatoxin in peanuts.

Davis, N. D.; Guy, M. L.; Diener, U. L.

Journal of the American Oil Chemists' Society 57 (3) 109–110 (1980) [8 ref. En] [Dep. of Bot., Plant Path. & Microbiol., Auburn Univ. Agric. Exp. Sta., Auburn, Alabama 36830, USA]

Groundnuts were screened for aflatoxin using a rapid, inexpensive fluorometric method. Groundnuts were ground and extracted with methanol, and the extract was treated with acidified zinc-acetate-sodium chloride solution, filtered, and diluted with water. Fluorescence of the extracts was compared with that from aflatoxin-free control groundnuts. Test samples (160) of several var. and grades of groundnuts were obtained from storage and from several commercial sources and were screened for the presence of aflatoxin. 135 samples (84%) were identified by this method as aflatoxin positive ($>$15 parts/billion) or aflatoxin negative ($<$15 parts/billion). Although 22 samples (13.6%) were incorrectly labelled as aflatoxin positive, most of these showed evidence of the presence of mould metabolites other than aflatoxin. 3 samples (1.8%) were incorrectly labelled as aflatoxin negative when they actually contained 20, 33, and 34 parts/billion aflatoxin. AS

93

Effect of graded doses of γ-irradiation on aflatoxin production by *Aspergillus parasiticus* in wheat.

Priyadarshini, E.; Tulpule, P. G.

Food and Cosmetics Toxicology 17 (5) 505–507 (1979) [18 ref. En] [Nat. Inst. of Nutr., Indian Council of Med. Res., Jamai Osmania PO, Hyderabad-500007, India]

Wheat grains were irradiated at dose levels of 50, 75, 100, 200 and 250 krad using a ^{60}Co irradiation source. Duplicate samples of the irradiated wheat and a non-irradiated sample were sterilized by autoclaving at 15 lb/in^2 for 15 min and then inoculated with 1 ml aliquots of a spore suspension of *A. parasiticus* and incubated at 28°C for 7 days. The irradiated wheat showed a dose dependent susceptibility to aflatoxin production. Both toxin production and free fatty acid levels of the wheat grains followed an exponential pattern as the irradiation dosage increased from 50 to 250 krad. VJG

94

[Use of preservatives, and their effects on mould growth and mycotoxin formation in bread.]

Dich, J.; Akerstrand, K.; Andersson, A.; Lönberg, E.; Josefsson, E.; Jansson, E.

Var Föda 31 (6) 385–403 (1979) [55 ref. Sv, en] [Toxikologiska Lab., Statens Livsmedelsverk, S-751 26 Uppsala, Sweden]

A method for detn. of preservatives in bread is described, based on isolation by steam distillation, conversion to the corresponding benzyl esters by treatment with benzyl bromide, and detn. by GLC using a 3% butanediol succinate polyester column, with a benzyl pentanoate internal standard. 28 retail samples of bread were analysed for preservatives; none exceeded the permitted levels. Experimental batches of bread, made with and without preservatives, were stored for 2 wk at room temp. (approx. 22°C), and examined for mould growth and mycotoxin formation. No clear effect of preservatives on mould growth was observed. Aflatoxin was detected in 3 of 24 samples, at concn. $\leq$15 mg/kg. Aflatoxin was detectable in non-mouldy areas surrounding the mould patches. Data are given for the mould spp. growing spontaneously on the bread. Studies were also conducted on inoculation of bread with *Aspergillus flavus*. Growth of *Asp. flavus* was greater at 22°C than at 15°C, and was slowed, but not prevented, by preservatives. Appreciable concn. of aflatoxins were formed at 22°C ($\leq$2000 µg/kg). AJDW

95

[Methods of test for edible fats and oils. (Determination of aflatoxin).]

Taiwan, National Bureau of Standards

Chinese National Standard CNS N6097, 2pp. (1979) [Ch]

96

Interactions of mycotoxins in animal production. Proceedings of a Symposium July 13, 1978, Michigan State University. [Conference proceedings]
United States of America, American Society of Animal Science; **United States of America,** American Dairy Science Association; **United States of America,** Committee on Animal Nutrition, National Research Council
viii + 197pp. ISBN 0-309-02876-0 (1979) [many ref. En] Washington, DC, USA; National Academy of Sciences.

This symposium developed from the work of a task force set up by the USA National Research Council to investigate the influence of mycotoxins on nutrient utilization. The symposium was divided into 4 parts: Review of known mycotoxins (pp. 3-39); Biological actions of mycotoxins on farm animals (pp. 43-136); Analytical methods for mycotoxins (pp. 139-153); and Contamination of feeds and residues of mycotoxins in animal tissues (pp. 157-195). Papers given include: Introduction, definition, and history of mycotoxins of importance to animal production, by C. W. Hesseltine (pp. 3-18, many ref.). Field and storage conditions for the production of mycotoxins and geographic distribution of some mycotoxin problems in the United States, by J. Tuite (pp. 19-39, 160 ref.). Biological effects of mycotoxins (other than alfatoxin) on poultry, by R. D. Wyatt (pp. 87-95, 34 ref.). Effects of mycotoxins on ruminants, by G. P. Lynch (pp. 96-117, many ref.). Biological effects of mycotoxins upon rumen-function and lactating dairy cows, by D. R. Mertens (pp. 118-136, 93 ref.). Utilization of aflatoxin contaminated feed, by A. C. Keyl & W. P. Norred (pp. 185-195, 4 ref.). A further 2 papers are abstracted separately in FSTA and are listed in the author index under **United States of America,** American Society of Animal Science [Mycotoxins Symposium]. SP

97

Aflatoxins: a significant issue in food sanitation with broader implications on environmental health management.
El-Ahraf, A.
Journal of Environmental Health 42 (2) 65-66 (1979) [6 ref. En] [Dep. of Health Sci. & Human Ecology, California State Coll., 5500 State College Parkway, San Bernardino, California 92407, USA]

98

Aflatoxin residues in Egyptian foods. I. Rice, corn and peanuts. (In '*Abstracts of the XII International Congress of Microbiology*' [see FSTA (1980) 12 10B73].) [Lecture]
Naguib, M. M.; Naguib, K.; Pohland, A. E.; Cambell, A. D.
p. 167 (undated) [En] [Nat. Res. Cent., Dokki, Cairo, Egypt]

A total of 1157 samples of rice, corn and peanuts was analysed for the presence of aflatoxin using AOAC Method II (BF) for rice and corn and the AOAC minicolumn procedure for peanuts. Positive aflatoxin samples were confirmed using the Przybylski derivative method. No aflatoxins were detected in any of the 514 rice samples analysed. On the other hand, 18.6% of the 279 local corn samples analysed contained aflatoxin B_1 at levels of 2.5-30 μg/kg; no other aflatoxins were observed. Of the 215 imported corn samples examined, only 4.6% were contaminated, and at lower levels (2.5-10 μg/kg). 149 peanut samples were analysed, 75 in-shell and 74 shelled. Of the in-shell samples analysed, 22.7% were contaminated at the following levels (μg/kg): B_1 6.4, B_2 6.4, G_1 6.4-12.8, and G_2 6.4. 32.4% of the shelled peanut samples were contaminated, at the following levels (μg/kg): B_1 6.4-32, B_2 6.4, G_1 6.4-25.4, and G_2 6.4. DIH

99

Mycotoxin residues in body fluids and tissues of food-producing animals. (In '*Abstracts of the XII International Congress of Microbiology*' [see FSTA (1980) 12 10B73].) [Lecture]
Patterson, D. S. P.
p. 59 (undated) [En] [Cent. Vet. Lab., Weybridge, Surrey, UK]

The public health hazard of mycotoxin residues in milk, eggs and tissues of food-producing animals is discussed. Assessments of relative hazards to man of direct and indirect exposure to mycotoxins, and effectiveness of current regulatory control measures are considered. MEG

100

Determination of aflatoxin M_1 by high-pressure liquid chromatography using fluorescence detection.
Beebe, R. M.; Takahashi, D. M.
Journal of Agricultural and Food Chemistry 28 (2) 481-482 (1980) [5 ref. En] [USDA, 50 United Nations Plaza, San Francisco, California 94102, USA]

An HPLC method developed for aflatoxins B_1, B_2, G_1 and G_2 in various foods was extended to detn. of a residue metabolite, M_1, in dairy products. Products tested were fluid milk, sour cream, cottage cheese, and buttermilk. The method was found to be rapid, accurate, sensitive, and selective. M_1 was determined at levels as low as 0.3 μg/kg and confirmed by formation of the trifluoroacetic acid reaction product. Recoveries were 93-125% at 1 μg/kg in 3 products. AS

101

Routine application of HPLC for quantification of aflatoxins in whole peanut kernels.
Knutti, R.; Balsiger, C.; Sutter, K.
Chromatographia 12 (6) 349-353 (1979) [9 ref. En] [Inst. for Toxicology, Swiss Fed. Inst. of Tech., Univ., Zürich, Switzerland]

High-pressure liquid chromatography (HPLC) was applied for separation and quantification of the aflatoxin concn. in 500 samples of shelled unroasted peanuts. Requirements of the method and reasons for choosing HPLC are discussed, as well as the problems arising from using the technique for this routine application. Sample preparation of a series of 10, plus 2 controls required 4-5 h. Reproducibility of peak area from 2 succeeding injections of the same sample solution was 2%, overall s.d. of the method 15%. At high aflatoxin concn. there were problems of extraction efficiency. Simultaneous detection by UV absorption and fluorescence was crucial for interpretation of the results. RM

102

[Aflatoxin contents of hazelnuts.] Untersuchungen zum Aflatoxingehalt in Haselnüssen.
Senser, F.
Gordian 79 (5) 117, 118, 120, 122, 123 (1979) [8 ref. De, en] [Deutsche Forschungsanstalt für Lebensmittelchemie, Garching, Federal Republic of Germany]

Fungal contamination and aflatoxin contents were determined in 96 samples of selected fresh hazelnuts from industry, and 30 samples of representative average quality nuts from retail sources. In addition each of the 96 samples was hand-sorted and damaged, discoloured and suspect nuts removed for separate examination. No aflatoxin was detected in the hand-sorted 96 samples, while 15 (17%) of the suspect subsamples, and 8 of the 30 retail samples gave positive results. 3 mould species were isolated and tested for toxin formation by 70-day incubation at 20–24°C, 50–60% RH on sterile and non-sterile hazelnut meal media. 6 of 17 strains of *Aspergillus flavus* Link and 1 of 3 *A. parasiticus* Spear strains were toxigenic, producing up to 1300 parts/billion (p.p.b.) aflatoxin B_1 on sterile, 400 p.p.b. on non-sterile hazelnut meal medium, suggesting inhibition of toxin formation by other microorganisms or by the medium. RM

103

Improbability of Iranian storage humidity being the principle cause of aflatoxin contamination of pistachio nuts. (In *'Abstracts of the XII International Congress of Microbiology'* [see FSTA (1980) 12 10B73].) [Lecture]
Haghighi, B.; Mojtahedi, H.; Danesh, D.; Suzangar, M.; Emami, A.; Barnett, R.
p. 169 (undated) [En] [Biochem. Dep., Univ. of Isfahan, Isfahan, Iran]

The max. RH during commercial storage of pistachio nuts, in the principle export area of Iran, is 80% for 1 h and 60–70% for 66 h. This communication reports the location in the nut and the rate of aflatoxin contamination at various temp. (20, 27, 42°C) and RH (75, 85, 95, 100%). RH was controlled by different salt solutions, aflatoxin was analysed by the BF method and microbiological contamination was determined by plating on salt malt agar. At 100% RH and 20°C, aflatoxin could be identified first in the outer green shell at 2 days which increased to a constant amount thereafter. Aflatoxin, however, was detected only after 4 days in the inner hard shell and kernel of whole nuts and continued to increase throughout the 10 day observation period. When commercially dehulled nuts were incubated at 75, 85 and 95% RH the nuts were completely hydrated at 11, 14 and 19% moisture, resp. at a min. time of 3 days where the incubation temp. was 42°C. No aflatoxin was produced at 75% RH at any temp., whereas at 85 and 95% RH aflatoxin appeared in a min. of 10 days and 1 day, resp. Taking into consideration laboratory rates, times, temp. effects and RH for aflatoxin contamination of pistachio nuts, it is concluded that aflatoxin production, under the conditions where 50% of Iranian export storage occurs, is improbable because of insufficient time in a too low RH even at extremely high levels (10^6/ml) of aflatoxin producing *A. flavus* contamination. AS

104

Correlation between *Aspergillus flavus* infection, fungicide activities and pistachio nut aflatoxicosis. (In *'Abstracts of the XII International Congress of Microbiology'* [see FSTA (1980) 12 10B73].) [Lecture]
Danesh, D.; Mojtahedi, H.; Haghighi, B.; Suzangar, M.; Barnett, R.
p. 169 (undated) [En] [Hort. Inst., Univ. of Isfahan, Isfahan, Iran]

Iranian pistachio nuts were experimentally harvested in 1975 and 1976; 7 and 6% resp. were infected with *A. flavus*, and of these 9.4 and 10% contained aflatoxin (1.5–50 ng/g). Freshly harvested ripe nuts were sprayed with an *A. flavus* spore suspension (10^6 spores/ml), dried, then sprayed with Benlate (0.1%) or Orthocide (0.2%), and incubated at 25°C 95% RH. The fungicides delayed aflatoxin production by 4 and 2 days, resp. DIH

105

Ammoniation of corn contaminated with aflatoxin and its effects on growing rats.
Southern, L. L.; Clawson, A. J.
Journal of Animal Science 50 (3) 459–466 (1980) [21 ref. En] [N. Carolina State Univ., Raleigh, N. Carolina 27607, USA]

Corn naturally contaminated with 2000 parts/billion (p.p.b.) total aflatoxin was adjusted to 17% moisture and ammoniated with 1.5% (w/w) anhydrous NH_3. This NH_3 treatment reduced the detectable concn. to 510 p.p.b. Since the consumption of aflatoxins via foods is a danger to humans, and may be associated with liver cancer, feeding trials were carried out with rats fed diets containing 83% corn which contained from 0 to 1670 p.p.b. aflatoxin to determine the nutritional quality and acceptance of ammoniated corn, as well as rat performance, liver wt. and serum protein levels. Results indicate that ammoniation of corn contaminated with aflatoxin may be a practical, economical and effective method of detoxification. AL

106

Recent outbreaks of mycotoxicoses in man in India. (In *'Abstracts of the XII International Congress of Microbiology'* [see FSTA (1980) 12 10B73].) [Lecture]
Bhat, R. V.; Krishnamachari, K. A. V. R.; Nagarajan, V.; Roy, D. N.; Tulpule, P. G.
p. 168 (undated) [En] [Nat. Inst. of Nutr., Indian Council of Med. Res., Hyderabad-500 007, India]

2 recent outbreaks of mycotoxicoses in humans caused by consumption of contaminated cereals were studied. An outbreak of aflatoxicosis with a high mortality rate was associated with consumption of maize containing up to 15.6 p.p.m. aflatoxin. Another outbreak of disease was associated with consumption of leavened bread made from ergoty pearl millet. The alkaloids in ergoty millet were different from those in ergoty rye or wheat, and the morphological nature of

the fungus, and the clinical symptoms were also different. This outbreak was termed enteroergotism, as distinct from vascular ergotism caused by ergoty rye. DIH

107

Aflatoxin M in perspective.
Stoloff, L.
Journal of Food Protection 43 (3) 226-230 (1980)
[38 ref. En] [Div. of Food Tech., Food & Drug Administration, Washington DC 20204, USA]

The steps are presented from the discovery of aflatoxin M_1 in the milk of a cow fed 'toxic' peanut meal to detn. of its relation to aflatoxin B_1, and the relation of aflatoxin M_1 to other animal metabolites of aflatoxin B_1. Estimates from controlled studies are given of the level and amount of aflatoxin M_1 to be expected in the milk of cows exposed to aflatoxin B_1 in their feed, followed by numerous survey results that corroborate the conclusion from the experimental estimates: levels of aflatoxin B_1 in uncontrolled dairy ration ingredients are sufficiently high to result in measurable aflatoxin M_1 (>0.1 ng/ml) in commercial milk supplies. Because the FDA has been unable to prevent occurrence of aflatoxin M_1 in milk in the USA by attempting to control the feed, an administrative guideline has been established at 0.5 parts/billion for aflatoxin M_1 in fluid milk products; consideration is being given to related guidelines for products manufactured from milk. AS

108

Aflatoxin residues in Egyptian foods. II. Milk and dairy products. (In *'Abstracts of the XII International Congress of Microbiology'* [see FSTA (1980) 12 10B73].) [Lecture]
Nahrous, A. M.; Naguib, M. M.; Naguib, K.; Pohland, A. E.; Campbell, A. D.
p. 168 (undated) [En] [Nat. Res. Cent., Dokki, Cairo, Egypt]

A total of 461 samples of dairy products obtained in Cairo over a period of 1 yr were examined for the presence of aflatoxins. 7.7% of 136 raw milk samples contained 0.2-0.4 µg aflatoxin M_1/l; only 1 of 146 pasteurized milks contained the mycotoxin (0.3 µg/l). 2 of 52 yoghurt samples contained 0.4 µg aflatoxin M_1/l. 4.9% of 81 samples of soft pickled Domiati cheese contained 10-25 µg aflatoxin B_1/kg and 1 sample also contained 25 µg aflatoxin G_1/kg. Examination of 52 core samples of Ras cheeses showed that 7.7% contained 10 µg aflatoxin B_1/kg and 1 sample also contained 10 µg aflatoxin G_1/kg; for the cheese rind, 15.38% of samples contained 10-20 µg aflatoxin B_1/kg and 15-20 µg aflatoxin B_2/kg. MEG

109

The species composition of fungi from meat products. (In *'Abstracts of the XII International Congress of Microbiology'* [see FSTA (1980) 12 10B73].) [Lecture]
Osipian, L. L.; Davtian, S. A.
p. 171 (undated) [En] [Inst. of Microbiol., Academy of Sci. of Armenian SSR, 378510 Abovian City, USSR]

Samples of meat and meat products with signs of spoilage were investigated. Microbiological analysis of investigated samples revealed the presence of 36 spp. of fungi; among them 3 sp. of genus *Mucor* were identified. The remaining isolated cultures were identified as representatives of *Hyphomycetales (Penicillium, Aspergillus, Cladosporium, Stemphylium, Alternaria, Fusarium)*. The most diversity was revealed in the genus *Penicillium*, represented by 18 spp. *Penicillium camemberti, P. martensii, P. roqueforti, P. stoloniferum, P. lanosum* may be evaluated as more distributed spp. in tested samples. Aspergilli were represented by 6 spp., among which *Aspergillus niger* is predominant. The data do not indicate the presence of specific fungi related to distribution on the meat products. 17 spp. from all isolated cultures are known as toxin producing. Toxicological tests have shown different degrees of toxicity of 11 strains from 18 tested cultures (13 spp.). AS

110

Biological effects of aflatoxins in swine. (In *'Interaction of mycotoxins in animal production'* [see FSTA (1980) 12 10C416].) [Lecture]
Edds, G. T.
pp. 67-76 (1979) [27 ref. En] [Dep. of Preventive Med., College of Vet. Med., Univ. of Florida, Gainesville, Florida 32610, USA]

Aflatoxicosis in swine induces liver damage and icterus, gross haemorrhages in many parts of the body, especially the ham areas with ataxia, stunting, and immunosuppression. While exposure of swine to rations at levels of 100-300 parts/billion (ppb) aflatoxin B_1 from weaning to market wt. produced no toxic effects, levels of 400 ppb or more did induce aflatoxicosis. In addition, exposure of swine to rations containing >100 ppb did result in possible hazardous residue levels of aflatoxin B_1 and M_1 in liver, kidney, and muscle tissues. AS

111

Mycotoxin residues in edible animal tissues. (In *'Interaction of mycotoxins in animal production'* [see FSTA (1980) 12 10C416].) [Lecture]
Stoloff, L.
pp. 157-166 (1979) [41 ref. En] [Bureau of Foods, FDA, Washington, DC. 20204, USA]

From metabolism studies with radioactively tagged aflatoxin B_1, ochratoxin A, patulin, penicillic acid, sterigmatocystin, T-2 toxin, and zearalenone, it is apparent that the mature animal is an effective toxin modifier and eliminator. Metabolites of the mycotoxins, with toxicities that vary widely in relation to the parent compounds, are the most likely tissue residues. No evidence could be found for accumulation of any of the toxins or their metabolites. The greatest demonstrated potentials for encountering a mycotoxin residue in edible animal tissue are aflatoxin M in cow's milk and ochratoxin A in swine kidney. AS

112

Simultaneous multi-mycotoxin determination by high performance thin-layer chromatography.
Lee, K. Y.; Poole, C. F.; Zlatkis, A.

Analytical Chemistry 52 (6) 837–842 (1980) [36 ref. En] [Dep. of Chem., Univ. of Houston, Houston, Texas 77004, USA]

An analytical method is described for the simultaneous detn. of 13 mycotoxins by high performance TLC (HPTLC). In 7 continuous multiple developments with 2 solvent systems of different polarity a base-line separation of sterigmatocystin, zearalenone, citrinin, ochratoxin A, patulin, penicillic acid, leuteoskyrin, and the aflatoxins B_1, B_2, G_1, G_2, M_1, and M_2 was obtained. About 1 h was required for the separation and quantitation of all 13 mycotoxins from one spot. By using in-situ scanning of the HPTLC plate, detection limits in the low ng range were obtained by UV-visible absorption (reflectance mode) and in the low pg range by fluorescence with a relative s.d. of 0.7–2.2% in the ng range. AS

113

[Determination of aflatoxins by liquid chromatography, and detection by spectrophotometry and spectrofluorimetry.]
Guyon, F.; Caude, M.; Rosset, R.
Revue Francaise des Corps Gras 26 (5) 217–223 (1979) [28 ref. Fr, de, en, es] [Ecole Superieure de Physique & de Chimie de Paris, 10 Rue Vanquelin, 75231 Paris Cedex 05, France]

Adsorption and partition chromatography (normal and reverse phase) was used for separating aflatoxins B_1, B_2, G_1 and G_2. Best results were obtained by adsorption chromatography, elution by dichloromethane:methanol:water (99.35:0.50:0.15) and spectrofluorimetric detection using a packed silica gel flow cell. Detection limits were 0.03–0.15 $\times 10^{-12}$ mole injected. AS

114

[Use of the Velasco method for analysis of mycotoxins in various products of plant origin.]
Bottalico, A.; Lerario, P.; Ricci, V.
Rivista della Societa Italiana di Scienza dell'Alimentazione 8 (5) 299–302 (1979) [25 ref. It] [Istituto di Patologia Veg., Univ., Bari, Italy]

The method of Velasco [see FSTA (1972) 4 7C166], based on separation of aflatoxins on a Florisil/silica gel/alumina minicolumn and UV fluorometric detection, using a Velasco Fluorotoxin Meter, was compared with visual detection after separation on the minicolumns, and TLC detn. Trials were conducted on spiked samples of groundnuts, soybean and sunflower presscakes, chickpeas, beans, almonds, wheat, maize, barley, cassava, silage, and a feed mixture. A table of results is given. Severe interference by other constituents of most of the food or feed samples studied was observed with Velasco's method. The filter fluorometer system did not allow differentiation of interfering impurity bands having max. fluorescence wavelengths close to those of aflatoxins but differing in colour; visual evaluation of the column permitted differentiation of these. The Velasco minicolumn/UV fluorometry method gives a total aflatoxin concn. rather than values for individual aflatoxins, whereas TLC gives data for concn. of individual aflatoxins. It is concluded that TLC techniques are likely to give better results than Velasco's method. AIDW

115

Bioenergetics of aflatoxin biosynthesis in *Aspergillus parasiticus*.
Rao, V. M.; Saraswathy, S.; Maggon, K. K.; Venkitasubramanian, T. A.
Journal of Food Science 45 (4) 1031–1035 (1980) [En] [Dep. of Biochem., Vallabhbhai Patel Chest Inst., Univ. of Delhi, Delhi-110007, India]

Variations in levels of adenine nucleotides during growth of A. parasiticus were studied under asparagine and Zn deficiency and correlated with aflatoxin biosynthesis. ATP levels decreased gradually from exponential to stationary phase but the reverse was true for ADP and AMP. However, AMP levels in stationary phase were virtually constant under all growth conditions employed. Increased AMP levels were observed in fungal mycelium on high aflatoxin-producing medium as compared to the deficient media. The onset of aflatoxin biosynthesis was however accompanied by a lowering of energy charge and ATP levels. IFT

116

Various heat treatments for aflatoxin decontamination in mungbean *(Vigna radiata* (L.) Wilczek).
Perez, R. A.; Ilag, L. L.
Philippine Phytopathology 13 (1/2) 24–31 (1977) [En] [Dep. of Plant Path., UP at Los Banos, College, Laguna 3720, Philippines]

Various heat treatments such as boiling, autoclaving, combination of autoclaving and boiling, and oven-dry heating were tested to determine their effects on reducing or eliminating the aflatoxin content of contaminated mung bean seeds. Complete elimination of aflatoxin was observed in the following treatments: boiling (100°C) for 3 h, autoclaving at 121°C for 15 min then boiling for 2 h, oven-heating at 200°C for 3 h, and oven-heating at 220 and 250°C for 30 min. Samples which were heated over 200°C were scorched and considered unfit for consumption. UPLB

117

Influence of environmental conditions of the physical, microbiological and chemical characteristics of peanut of Tatu variety *(Arachis hypogaea* L.)
Tango, J. S.
Dissertation Abstracts International, B 40 (6) 2592: Order no. 79-27554, 203pp. (1979) [En] [Louisiana State Univ., Baton Rouge, Louisiana 70803, USA]

Environmental factors studied included season, growing area, soil type, production methods and amount of rainfall during growth. The peanuts studied had been grown at several locations in Brazil. Pods were examined for % shell, % kernel and bacteria and mould counts on the shell and in the whole nut. Kernels were examined for % spoiled kernels, % moisture, % oil, % protein and aflatoxin B_1 content. Oil was examined for % free fatty acids (FFA), peroxide value (PV) and fatty acid composition. Peanuts harvested during the rainy season had higher values for kernel and oil contents, mould counts on the shell and in whole nuts, moisture, spoiled kernels, FFA, aflatoxin B_1 and

PV than peanuts harvested during the dry season. The quality of peanuts held in seed stores was much better than that of peanuts obtained from oil mills. Peanut quality was found to be affected by growing area and soil type, e.g. peanuts grown in the Sorocabana region had fewer spoiled kernels, less aflatoxin B_1, less FFA and lower mould counts than peanut grown in 3 other regions. The amount of rainfall during growth did not influence peanut quality. Relationships were found between some of the characteristics studied, e.g. aflatoxin B_1 content showed a high correlation with mould counts, % moisture, number of spoiled kernels and % FFA. JA

118

Occurrence of ochratoxin- and citrinin-producing fungi on developing Danish barley grain.
Lillehoj, E. B.; Goransson, B.
Acta Pathologica et Microbiologica Scandinavica, B 88 (3) 133-137 (1980) [16 ref. En] [S. Reg. Res. Cent., USDA, New Orleans, Louisiana, USA]

33 test fields of Danish barley were sampled for *Aspergillus* and *Penicillium* infection at 1-2 wk after anthesis, 3-4 wk after anthesis and at grain maturity. 96 *Aspergillus* and 147 *Penicillium* isolates were obtained in total, with significant presence of both genera even at the earliest sampling stage. 108 isolates were identified to sp. level. 31 *Aspergillus* isolates belonged to 5 spp., chiefly *A. flavus;* 77 *Penicillium* isolates belonged to 14 spp., chiefly *P. cyclopium* and *P. purpurescens.* 2 *Aspergillus* isolates (both *A. ochraceus)* produced ochratoxin, as did 6 *Penicillium* isolates (4 of which were *P. purpurescens).* 1 *P. granulatum* isolate produced citrinin. DIH

119

Mycotoxins in milk and dairy products. [Review]
Lück, H.; Wehner, F. C.
South African Journal of Dairy Technology 11 (4) 169-176 (1979) [many ref. En, af] [Anim. & Dairy Sci. Res. Inst., Irene 1675, South Africa]

This review briefly outlines the biochemical reactions leading to the formation of mycotoxins, and discusses possible human health hazards resulting from mould-damaged cattle feeds (e.g. mycotoxins in milk and milk products) and from consumption of mould-contaminated or mould-ripened cheeses. Cheese appears to be a poor medium for mycotoxin formation, especially at low temp. Cheeses (such as Camembert, Brie and Blue-veined) have been consumed for many years without ill effect. The safety of these products can be ensured by using mould starter strains that do not produce toxins, and by close attention to hygiene, temp. and humidity control to ensure that contamination with mould spores does not occur. MEG

120

[National Food Administration Ordinance amending the Ordinance on Contaminants in Foods.]
Sweden, Statens Livsmedelsverk
Statens Livsmedelsverks Författningssamling SLV FS:3, 2pp. (1980) [Sv]

This Ordinance specifies amendments to the Ordinance on Contaminants in Foods, SLV FS 1978:34 [FSTA (1979) 11 5U302]. Revised max. tolerances are: aflatoxins, 0.005 mg/kg in all foods; histamine, 200 mg/kg in fish products; Sn, 150 mg/kg in grape or apple juice, 250 mg/kg in other foods; and vinyl chloride, 0.01 mg/kg in all foods. This Ordinance came into force on 1 July 1980. AJDW

121

Aflatoxigenic potential for aspergilli on sucrose substrates.
Llewellyn, G. C.; Jones, H. C.; Gates, J. E.; Eadie, T.
Journal of the Association of Official Analytical Chemists 63 (3) 622-625 (1980) [11 ref. En] [Dep. of Biol., Virginia Commonwealth Univ., Richmond, Virginia 23284, USA]

Sucrose concn. of 3, 10, 20 and 30% in Czapek Dox broth served as the carbon source for growth, aflatoxin production, and sporulation for *Aspergillus parasiticus* NRRL 2999 and *A. flavus* NRRL 3557, 5862, and 5013. All cultures produced mycelial growth and sporulated in all sucrose concn. during the 12-day growth period. The area of mycelial mat coverage/h increased directly with increased sugar concn. The 20 and 30% sucrose concn. inhibited mycelial growth for 5862. The 30% sucrose cultures of 3557 and 5862 failed to produce detectable levels of aflatoxins. All other isolates produced B_1 and G_1 in approx. 4:1 ratio in all sucrose concn. Only 2999 was a substantial producer of aflatoxin in all 4 sucrose cultures, ranging from 72 to 96 µg/ml medium. *A. flavus* 5013 produced the most toxin, 144 and 126 µg/ml medium in the 10 and 20% sucrose cultures, resp. The 10 and 20% sucrose cultures were most conductive to aflatoxin production. Since these sucrose levels correspond closely to the levels in many food and drink products, especially home-made products, care and attention should be taken to keep them free of aflatoxigenic spores. Extensive mycelial growth and sporulation, even in aflatoxigenic strains, do not necessarily result in comparably high aflatoxin levels. Routine extraction and quantitation procedures for aflatoxin were applicable and provided satisfactory results. AS

122

Examination of areca nut for the presence of aflatoxins.
Thuan, C. E.; Amarasingham, R. D.
Malaysian Agricultural Journal 51 (3) 305-310 (1978) [3 ref. En] [Dep. of Chem., Penang Branch, Malaysia]

Aflatoxins B_1 and G_1 were isolated from spoilt areca nuts by the method of B. D. G. Jones [Methods of aflatoxin analyses (1972) Tropical Products Institute, London]; the method is described. AL

123

[The Brazil nut. II. Spoilage and conditions for aflatoxin formation.] Die Paranuss. II. Verderb und Bildungsbedingungen für Aflatoxin.
Frank, H. K.; Betancourt, L.; Uboldi, M.
Deutsche Lebensmittel-Rundschau 76 (2) 47-50 (1980) [18 ref. De, en, fr] [Bundesforschungsanstalt für Ernährung, Karlsruhe, Federal Republic of Germany]

The incidence of aflatoxins in Brazil nuts sold in the

Federal Republic of Germany is discussed, with reference to a compilation of literature data for the period 1977–1979; these data vary considerably. Studies were conducted on effects of RH (75–100%) on growth of *Aspergillus* spp. on Brazil nuts (externally inoculated with *Asp. flavus* and *Asp. parasiticus*) during storage for ≤90 days. The results show the % of mouldy kernels to increase with RH, reaching a max. incidence of 75% at 100% RH. 28 nuts were perforated, the kernels were inoculated with *Asp. flavus*, and the nuts were incubated at 30°C and 100% RH. No significant wt. changes were observed during storage, although almost all kernels were spoiled; it is therefore concluded that mouldy and sound in-shell nuts cannot be differentiated on the basis of wt. or sp. gr. It is recommended that Brazil nuts should be sold only in the shelled state. [See FSTA (1980) 12 7J958 for part I.] AJDW

124

Decontamination of groundnut oil from aflatoxin by adsorption-cum-filtration.

Basappa, S. C.; Sreenivasa Murthy, V.
Indian Journal of Technology 17 (11) 440–441 (1979) [7 ref. En] [Cent. Food Tech. Res. Inst., Mysore-570 013, India]

Attempts were made at laboratory and pilot plant level to remove aflatoxin from groundnut oil by using filter pads. The filter pads tried were (i) Celite and salt (1:10), (ii) activated fullers' earth and salt (1:2 and 1:10), and (iii) kaolin and salt (1:2). Of these (iii) proved best for removing aflatoxin, but the rate of filtration was low. Hence (ii) with 1:2 ratio proved most efficient (96% aflatoxin removed) and rapid. This was further used to remove aflatoxin on a pilot scale employing a plate-and-frame filter press, the efficiency being 88–90% for removal of aflatoxin. The pad can be used to filter 200 kg oil at a filtration rate of 12 kg oil/h, the aflatoxin content in filtered oil being 0.025 p.p.m. CFTRI

125

[*Penicillium roqueforti*, its morphology, physiology, use in cheesemaking, and mycotoxins.] [Review]

Moreau, C.
Lait 60 (595/596) 254–271 (1980) [110 ref. Fr, en] [Cent. Nat. de la Recherche Sci., Lab. de Biol. Vegetale et de Microbiol., Univ. de Bretagne Occidentale - 29283 Brest Cedex, France]

This review of *P. roqueforti* begins with a brief history of its classification and nomenclature, and then describes its morphology, cultural conditions, role in cheesemaking and its occurrence as a contaminant in other dairy products, cereals, fruits, confectionery, edible oils and meat products. Mycotoxin formation (including PR toxin and other eremophilan derivatives, roquefortine, isofumigaclavins, penicillic acid, patulin and mycophenolic acid) is also discussed. These mycotoxins are not found in cheese. MEG

126

Inhibitory effects of spices on growth and toxin production of toxigenic fungi.

Hitokoto, H.; Morozumi, S.; Wauke, T.; Sakai, S.; Kurata, H.
Applied and Environmental Microbiology 39 (4) 818–822 (1980) [26 ref. En] [Dep. of Microbiol., Tokyo Metropolitan Res. Lab. of Public Health, Shinjuku-ku, Tokyo, 160 Japan]

The inhibitory effects of 29 commercial powdered spices on the growth and toxin production of 3 spp. of toxigenic *Aspergillus* were observed by introducing these materials into culture media for mycotoxin production. Of the 29 samples tested, cloves (*Caryophyllus*), star anise seeds (*Illicium anisatum*) and allspice (*Pimenta*) completely inhibited the fungal growth, whereas most of the others inhibited only the toxin production. Eugenol extracted from cloves and thymol from thyme caused complete inhibition of the growth of both *Aspergillus flavus* and *Asp. versicolor* at 0.4 mg/ml or less. At a concn. of 2 mg/ml, anethol extracted from star anise seeds inhibited growth of all the strains. AS

Form of Declaration and Undertaking

To the Editor, International Food Information Service, Lane End House, Shinfield, Reading, RG2 9BB, Berkshire, England.

1. I...

of...

Hereby request you to make and supply to me a

photocopy of the artice covered by Abstract No. ....

Journal name...

Volume .... Part .... Pages .... Year ....

which I require for the purposes of research or private study.

2. I have not previously been supplied with a copy of the said article/part of the said work by any librarian.

3. I undertake that if a copy is supplied to me in compliance with the request made above, I will not use it except for the purposes of research or private study.

Signature .... Date ....

(Note: This must be the personal signature of the person making the request. A stamped or typewritten signature or the signature of an agent is NOT sufficient.)

4. Send this form and remittance (20p per page for photocopies, min. charge £2.00 per article) to the above address. A deposit or credit system for payment is also in operation. Details are available on request.

Note: Additional forms are available on-request.

Food Annotated Bibliograp

	1969-1979 Price	1980 Price	1981 12 monthly issues Price
1. Application of Reverse Osmosis to Food Processing	☐ £10.00	☐ £5.00	☐ £8.00
2. New Sources of Food Protein	☐ £18.00	☐ £11.50	☐ £18.00
3. Natural and Synthetic Sweeteners	☐ £11.00	☐ £6.00	☐ £9.50
4. Techniques for Analysis of Flavour Volatiles	☐ £12.00	☐ £7.00	☐ £11.00
5. Microwaves in Food Processing	☐ £9.50	☐ £4.50	☐ £8.00
6. Texture Analysis of Foods	☐ £15.00	☐ £7.50	☐ £12.00
7. Synthetic Dairy Products	☐ £10.00	☐ £5.00	☐ £8.50
8. Acidulants in Food	☐ £10.00	☐ £5.00	☐ £8.00
9. Agglomeration of Powders	☐ £10.00	☐ £5.00	☐ £8.00
10. Aseptic Packaging	☐ £10.00	☐ £6.00	☐ £9.00
11. EEC Regulations	☐ £10.00	☐ £5.00	☐ £8.00
12. Toxicology of Food Additives	☐ £11.00	☐ £6.00	☐ £9.50
13. Deep Fat Frying	☐ £13.00	☐ £7.00	☐ £11.00
14. Viscosity of Foods	☐ £11.00	☐ £5.50	☐ £8.50
15. Taste Panels in Food Science	☐ £12.00	☐ £7.00	☐ £11.00
16. Taints in Food	☐ £10.00	☐ £5.50	☐ £9.00
17. Microbial Toxins in Food	☐ £12.00	☐ £7.00	☐ £11.00
18. Smoked Food Products	☐ £10.00	☐ £5.00	☐ £8.00
19. Disposal of Waste Food Products	☐ £14.50	☐ £7.50	☐ £12.00
20. Use of Glucose in Food Products	☐ £9.50	☐ £4.50	☐ £8.00
21. Emulsifiers in Foods	☐ £11.00	☐ £6.00	☐ £9.50
22. Stabilizers in Foods	☐ £11.00	☐ £6.00	☐ £9.50
23. Staling and Antistaling Additives	☐ £9.50	☐ £4.50	☐ £8.00
24. Catering Industry	☐ £9.50	☐ £5.50	☐ £8.50
25. Antioxidants	☐ £11.00	☐ £6.00	☐ £9.50
26. Nitrosamines	☐ £9.50	☐ £4.50	☐ £8.00
27. Content and Analysis of Mercury in Foods	☐ £10.00	☐ £6.00	☐ £9.50
28. Content and Analysis of Lead in Foods	☐ £10.00	☐ £5.00	☐ £8.00
29. Heatable Packs	☐ £9.50	☐ £4.50	☐ £7.50
30. Sulphur Dioxide in Food Products	☐ £10.00	☐ £5.00	☐ £8.00
31. Lactic Acid Bacteria in Beverages and Food	☐ £12.00	☐ £7.00	☐ £11.00
32. Colorants	☐ £10.00	☐ £5.00	☐ £8.00
33. Browning of Foods	☐ £10.00	☐ £5.00	☐ £8.00
34. Aflatoxins	☐ £10.00	☐ £6.00	☐ £9.50
35. Antibiotic Properties and Residues in Food excluding Nisin	☐ £9.00	☐ £4.50	☐ £7.50
36. Nisin	☐ £9.00	☐ £4.50	☐ £7.50
37. Cadmium in Foods	☐ £9.50	☐ £5.00	☐ £8.00
38. Coffee	☐ £10.00	☐ £5.50	☐ £9.00
39. Sorbic Acid	☐ £10.00	☐ £5.00	☐ £8.00
40. Arsenic in Foods	☐ £9.00	☐ £5.00	☐ £8.00
41. Ascorbic Acid	☐ £9.00	☐ £5.50	☐ £9.00
42. Thickeners and Gelling Agents	☐ £8.50	☐ £5.00	☐ £8.00
43. Pseudomonadaceae and Food Processing	☐ £9.00	☐ £4.50	☐ £7.50
44. Spores in Food	☐ £8.00	☐ £5.50	☐ £8.50
45. Breadmaking	☐ £10.00	☐ £5.00	☐ £8.00
46. Bread Properties	☐ £9.00	☐ £4.50	☐ £7.50
47. Food Science and Technology Books	☐ £15.00	☐ £9.00	☐ £16.00
48. Nitrates and Nitrates in Meat Products	* ☐ £10.00	☐ £5.50	☐ £9.00
49. Eggs and Poultry Meat	☐ £15.00	☐ £8.00	☐ £12.50
50. Mycotoxins in Foods (Excluding Aflatoxins and Microbial Toxins)	* ☐ £8.00	☐ £5.00	☐ £8.00
51. Meat Canning	* ☐ £10.00	☐ £5.00	☐ £9.00

* Only available from 1974.

Prices include postage by surface mail. For airmail rates, please apply to address below.

To order, or obtain further information, mark the item required, add your name and address and send cash, cheque or postal order to :

INTERNATIONAL FOOD INFORMATION SERVICE (IFIS),
LANE END HOUSE,
SHINFIELD, READING. RG2 9BB.
ENGLAND.

Name ....

Address ....

INTERNATIONAL FOOD INFORMATION SERVICE

ifis

FAB 34

AFLATOXINS

SELECTED FROM VOLUME 13

FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

under the direction of:-

Commonwealth Agricultural Bureaux, Farnham Royal, Slough; Gesellschaft fur Information und Dokumentation, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen.

INTRODUCTION

Food Annotated Bibliographies (FABs) are collections of abstracts on specific topics in food science and technology. The topics are chosen by the staff of the International Food Information Service as being of particular interest or importance. The topics normally interest individual workers, who may not require the full information provided in Food Science and Technology Abstracts, from which the abstracts for FABs are taken. The size and the cost of the FABs are controlled as much as possible with the interests of individual workers in mind.

Titles of the FABs now available are given on the back cover of this booklet. For up-to-date lists of FABs or suggestions for new topics please write to the address on the back cover. New subjects are searched for at least the five most recent volumes of Food Science and Technology Abstracts. Thereafter each FAB is updated monthly. Copies of each months abstracts on any topic may be obtained as indicated on the back cover of this publication. At the end of each volume of up-dating, the abstracts are merged and made available as a separate supplement to the original FAB.

Some of the larger FABs have been divided into sections to facilitate use. FAB 47 also has a subject and author index provided.

Copies of all original articles referred to in the abstracts may be bought (or occasionally borrowed) from the International Food Information Service. A form for ordering these is provided at the end of this FAB.

Coverage of the subject has been restricted to that of Food Science and Technolggy Abstracts, which covers over 1200 of the important food journals, patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularl needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

EDITOR

1

Inhibition of aflatoxin biosynthesis by organophosphorus compounds.
Dutton, M. F.; Anderson, M. S.
Journal of Food Protection 43 (5) 381–384 (1980) [14 ref. En] [Dep. of Life Sci., Trent Polytech., Burton Street, Nottingham NG1 4BU, UK]

Effect of a range of organophosphorus and various other compounds on production of aflatoxin by *Aspergillus flavus* was investigated. 5 organophosphorus compounds, Chlormephos, Ciodrin, Naled, Phosdrin and Trichlorphon, at concn. of 20 and 100 μg/ml of culture fluid were found to have activity similar to Dichlorvos, in that they lowered the level of aflatoxin produced and caused formation of several anthraquinone pigments. 2 of these pigments have not previously been described; one was named Versicol (suggested structure presented) whilst the other was shown to be its acetate derivative. A rationale is suggested for the required elements of structure, which are necessary for an organophosphorus compound to have Dichlorvos-type activity. 2 unrelated compounds, ammonium nitrate and Tridecanone were also found to elicit Dichlorvos-type activity. It is likely that tridecanone or its breakdown products competitively inhibit enzymes involved in aflatoxin biosynthesis. It is possible that this inhibition effect explains the lowering of aflatoxin production in lipid-rich commodities infected by *A. flavus*.   AS

2

[Mycotoxins and mycotoxicoses.] [Review]
Uboldi Eiroa, M. N.
Boletim do Instituto de Tecnologia de Alimentos, Brazil 16 (4) 355–411 (1979) [57 ref. Pt, en] [Inst. de Tecnologia de Alimentos, Campinas, Sao Paulo, Brazil]

Aspects considered in this review include: factors influencing growth and toxin formation by moulds in foods (a_w, pH, composition of the substrate, redox potential, temp., RH); the main mycotoxins (including aflatoxins, sterigmatocystin, luteoskyrin, rugulosin, ochratoxin, cyclopiazonic acid, rubratoxins, citrinin, gliotoxin, patulin, penicillic acid, sporidesmins, diplodiatoxins, citreoviridin, stachyobotryotoxin, ergot, tremortin and kojic acid); microorganisms forming these toxins; symptoms of poisoning with these mycotoxins; epidemiological aspects; prevention of mycotoxicoses; detoxification of contaminated foods and feeds; analytical techniques; and tolerances for mycotoxins in foods.   AJDW

3

Potential for aflatoxin development in low temperature drying systems.
Ross, I. J.; Loewer, D. J.; White, G. M.
Transactions of the ASAE 22 (6) 1439–1443 (1979) [21 ref. En] [Agric. Eng. Dep., Univ. of Kentucky, Lexington, Kentucky, USA]

An equilibrium grain drying model was used to simulate temp. and equilibrium RH in the grain mass during low-temp. drying, to predict the potential for aflatoxin development. Within the test range of harvest moisture contents (18–22%), air flow rates (1 and 2 ft^3/min bushel) and drying air temp. rises above ambient (2–10°F) tested, neither harvest moisture content nor air flow rate affected potential aflatoxin development. Potential toxin production was affected by temp. rise above ambient, with greater potential at higher temp. rise. Results show a definite potential for aflatoxin development in low temp. drying systems during the normal harvest periods in the Southern USA. A chart was developed to indicate the potential for aflatoxin production for various drying air and grain temp. conditions at harvest at any location and harvest time.   RM

4

Terretonin, a toxic compound from *Aspergillus terreus*.
Springer, J. P.; Dorner, J. W.; Cole, R. J.; Cox, R. H.
Journal of Organic Chemistry 44 (26) 4852–4854 (1979) [12 ref. En] [Merck Sharpe & Dohme Res. Lab., Rahway, New Jersey 07065, USA]

The isolation and structure detn. of terretonin, a new unique toxic metabolite of *A. terreus* is reported. The structural characterization included UV, IR, MS, circular dichroism, H-NMR, ^{13}C-NMR and X-ray analysis.   AS

5

Growth, sporulation and aflatoxin production by *Aspergillus parasiticus* on strained baby foods.
Llewellyn, G. C.; Duckhardt, N. E.; Fisher, M. F.; Eadie, T.; O'Rear, C. E.
Journal of Food Protection 43 (6) 428–430, 434 (1980) [24 ref. En] [Dep. of Biol., Virginia Commonwealth Univ., Richmond, Virginia 23284, USA]

4 pureed foods were inoculated with *A. parasiticus* and cultured at 15° and 26°C in 2 series of experiments. The aflatoxigenic mould produced mycelia and sporulated at both temp. The foods ranked in mean total yield of aflatoxin (μg/g substrate) in the following order: peas > squash > green beans > pears, for both temp. Aflatoxins B_1 and G_1 were produced in higher % than B_2 and G_2 in each food at both temp. At 26°C, total aflatoxin produced ranged from 8 to 71 μg/g of substrate, and at 15°C the mean for the 4 foods was from 3 to 50 μg/g. Temp. and substrate were the primary variables which contributed to sporulation rate, toxin production and toxin ratios. Peas and squash should be considered primary and highly supportive substrates for aflatoxin production, and absolute prevention of aflatoxigenic spore contamination in the foods studied is essential. An occasional testing of these foods for aflatoxin seems warranted. A lower temp. during aflatoxin formation decreased total toxin formed, but did not prohibit aflatoxin occurrence, whilst tending to divert the type of toxin produced from B_1 to the less dangerous G_1 and G_2. Aflatoxin would appear to be a problem in these foods only under rare conditions of processing and consumer usage. If such aflatoxigenic spore contamination should occur, the levels produced would be significant.   AS

6

[Effect of number of conidia in inoculum on aflatoxin B_1 production by *Aspergillus terreus* ZMTF 310.]
Durakovic, S.; Pospisil, O

Prehrambeno Tehnoloska Revija 16 (1) 14-15 (1978) [10 ref. Sh, en][Tehnoloski Fak., Zagreb, Yugoslavia]

Grains of 'Libelula' wheat cv. were moistened, sterilized, inoculated with conidia of the title mould sp. at 3.75×10^5, 7.5×10^5 or 1.5×10^6/g and incubated at 28.5 or 38.5% moisture content at 32°C for ≤336 h. Contents of aflatoxin B_1 were determined every 48 h. The results are tabulated for each variant; greatest production of aflatoxin B_1 (3 mg/kg) was with wheat inoculated at the highest rate and incubated at 38.5% moisture for 192 h. SKK

7

[Formation of kojic acid and aflatoxin by *Aspergillus flavus* in synthetic substrate and in grain maize.] Bildung von Kojisäure und Aflatoxin durch *Aspergillus flavus* in synthetischem Substrat und in Körnermais. [Lecture]

Schröpfel, E.; Müller, H.-M.

Landwirtschaftliche Forschung Sonderheft 35, 570-585 (1979) [37 ref. De, en, fr][Univ. Hohenheim, Postfach 106/06100, D-7000 Stuttgart 70, Federal Republic of Germany]

Spores of a strain of *A. flavus* that was toxigenic in synthetic medium were inoculated into corn at 38% moisture content (MC), pH 2, 4 or 9, and into corn silage, 32% MC, pH 4.5, and incubated at 20°C. Max. amounts of kojic acid and aflatoxin B_1 were produced at pH 2, max. aflatoxin B_2 at pH 9. No aflatoxin G_1 or G_2 was formed. Toxin formation was suppressed and mould growth greatly reduced by treating corn with propionic acid at the following concn: 0.3% for 18.1% MC corn, 0.53% for 24.3% MC, 0.75% for 32.5% MC, and 0.95% for 40.0% MC. [See FSTA (1981) 13 1A3.] RM

8

[Occurrence of toxigenic moulds on cereals of varying provenance.] Zum Vorkommen toxinbildender Schimmelpilze in Cerealien unterschiedlicher Herkunft. [Lecture]

Bauer, J.; Gedek, B.

Landwirtschaftliche Forschung Sonderheft 35, 562-569 (1979) [24 ref. De, en, fr][Univ. München, Veterinärstrasse 13, D-8000 Munich 22, Federal Republic of Germany]

307 mould strains of the genera *Aspergillus* (122) and *Penicillium* (185) were isolated from 107 cereal samples (81 maize, 17 wheat, 7 barley, 2 oats). After enrichment of their secondary metabolites in YES (yeast extract sucrose) medium the cultures were extracted with chloroform and examined for mycotoxins by TLC. 115 strains producing ≥1 of the following toxins were identified: penicillic acid, 63 strains (20.5%); kojic acid 41 (13.3%); cyclopiazonic acid 25 (8.1%); aflatoxins B_1 and B_2 15 strains each (4.9%); citreoviridin 3 (1%); luteoskyrin 3 (1%); citrinin 2 (0.6%); sterigmatocystin 2 (0.6%); ochratoxin A 1 (0.3%). Although both European and USA maize samples contained about 3 strains/sample, 44.3% of the strains isolated from USA maize were toxigenic, vs. 33.3% from European maize and 28.0% from all European cereals. *A. flavus* strains isolated from USA maize produced aflatoxins B_1 and B_2, as well as cyclopiazonic acid, more frequently than strains from European samples. [See FSTA (1981) 13 1A3.] RM

9

Extraction, cleanup, and quantitative determination of aflatoxins in corn.

Thean, J. E.; Lorenz, D. R.; Wilson, D. M.; Rodgers, K.; Gueldner, R. C.

Journal of the Association of Official Analytical Chemists 63 (3) 631-633 (1980) [6 ref. En][Mycotoxin Res. Lab., Plant Path., Univ. of Georgia, Coastal Plain Exp. Sta., Tifton, Georgia 31794, USA]

A method is proposed for extraction and cleanup of corn samples for the quantitation of 4 aflatoxins by HPLC. After aqueous methanol extraction, ammonium sulphate treatment, and partition of aflatoxins into chloroform, sample extracts are partially purified on Sep-Pak cartridges or small columns packed with HPLC grade silica; cleanup requires only 13 ml solvent/sample. Aflatoxins B_1, B_2, G_1, and G_2 in the purified extract are resolved in about 10 min by normal phase HPLC on a microparticulate (5 µm) silica gel column with a 50% water-saturated chloroform/cyclohexane/acetonitrile/ethanol solvent, and are measured by UV fluorescence in a silica gel-packed flowcell. Recoveries of added aflatoxins B_1, B_2, G_1, and G_2 were 84-118% at levels of 1.5-125 µg/kg. AS

10

Aflatoxin in milk, cheese and other dairy products. (In *'Proceedings from the first biennial Marschall International Cheese Conference'* [see FSTA (1981) 13 1P59].) [Lecture]

Marth, E. H.

pp. 241-260 (undated) [26 ref. En][Dep. of Food Sci. & Bact., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Aspects considered in this review article include the major aflatoxins, occurrence of aflatoxin in feeds in the USA, routes by which it can get into the milk and milk products, its fate in the milk during processing, occurrence of aflatoxin M_1 in commercial dairy products, and aflatoxin in mouldy dairy products. FL

11

[Study of presence of aflatoxins B_1 and M_1 in meat products.]

Bartos, J.; Matyas, Z.

Veterinarni Medicina 25 (2) 115-118 (1980) [23 ref. Cs, ru, en][Vykumny Ustav Vet. Lekarstvi, 621 32 Brno, Czechoslovakia]

Using mostly the method of Tuinstra & Bronsgeest [FSTA (1976) 8 1P159], 64 samples of 31 named varieties of meat products were examined for presence of aflatoxins during June-Nov. 1978. Aflatoxin B_1 was not detected in any of the samples. Aflatoxin M_1 was found in liver paste, rolled smoked shoulder, and Spisska sausage, the semi-quantitative evaluation indicating quantities lower by 2-2.5 orders of magnitude than the Czechoslovak tolerance limit of 5 µg/kg. SKK

12

Studies on aflatoxins, aspergillus and bacterial contamination in selected Indian spices involved in international trade.

Marashetty, S.

Dissertation Abstracts International. B 40 (9) 4133 (1980) [En] [Univ. of Waterloo, Ontario, Canada]

A rapid method for detecting aflatoxins in spices was developed by modifying a minicolumn extraction technique. Aflatoxin B_1 levels of 15-120 μg/kg were found in samples of black and red pepper, ginger and turmeric destined for export from India. The *Aspergillus flavus-oryzae* group was found to be a common component of the mycoflora of spices during drying. Scanning electron microscopy of insect parts revealed that *Tribolium castaneum* and *Sitotroga cerealella* were vectors of mould spores. Mould contamination of red pepper in warehouses in Karnataka (India) was found to be associated with '*Aspergillus*-loaded' pods, insect infestation and high RH. A simulated storage study demonstrated a preferential RH dependency in the colonization and pathology of red peppers naturally contaminated with various *Aspergillus* groups; 95% RH favoured max. growth and aflatoxin production by *Asp. flavus*. Infection and colonization by *Asp. halophilicus* in red pepper were studied by scanning electron microscopy; appressoria and penetration pegs were demonstrated and entry through stomata was also encountered. A bacteriological study of spices at the point of export indicated that most samples contained >1 million aerobic mesophiles/g. *Escherichia coli, Klebsiella pneumoniae, Acinetobacter calcoaceticus* and *Streptococcus faecalis* were found in black pepper at the retail level in Toronto (Canada). JA

13

Chromatographic analysis of mycotoxins on thin layers of rice starch.

Miskovic, D.

Chromatographia 13 (6) 342-344 (1980) [12 ref. En] [Fac. of Sci., Univ. of Novi Sad, 21000 Novi Sad, Yugoslavia]

The TLC separation and UV detection of 12 mycotoxins on rice starch is described, including the effect of solvent systems on the fluorescence, and the mechanism of chromatographic separation. R_f values of aflatoxins B_1, B_2, G_1, G_2, M_1 and M_2, zearalenone, zearalenol, ochratoxins A, B, B-ester and C, in 3 solvent systems (0.15 ml of formic acid + 20 ml benzene, toluene or xylene) are tabulated, together with lower limits of visual detection (fluorescence at 254-366 μm) (i.e. 10^{-3} μg aflatoxins, 10^{-1} μg zearalenone and zearalenol, 10^{-3} μg ochratoxins.) RM

14

Densitometric equipment for rapid quantitation of aflatoxins on thin layer chromatograms.

Dickens, J. W.; McClure, W. F.; Whitaker, T. B.

Journal of the American Oil Chemists' Society 57 (7) 205-208 (1980) [2 ref. En] [North Carolina State Univ., PO Box 5906, Raleigh, N. Carolina 27650, USA]

A densitometric instrument (Spotmeter) has been designed for rapid measurement of aflatoxin on TLC plates, which measures the total amount of fluorescence of the aflatoxin spot and thus eliminates the need for scanning mechanisms, plotters and integrators incorporated into most commercially available densitometers used for aflatoxin analyses. In comparison with a Schoeffel SD 3000 Spectrodensitometer, the Spotmeter was more accurate in 1 test and at least equally accurate in another test, making measurements in ¼ the time required for the Spectrodensitometer and costing about ⅙ as much as commercially available densitometers suitable for aflatoxin analyses. AS

15

Dual-wavelength fiber optic photometer measures fluorescence of aflatoxin contaminated pistachio nuts.

McClure, W. F.; Farsaie, A.

Transactions of the ASAE 23 (1) 204-207 (1980) [9 ref. En] [Biol. & Agric. Eng. Dep., N Carolina State Univ., Raleigh, N. Carolina, USA]

The dual-wavelength fibre-optic fluorescence photometer was tested by measuring the sorting index k $\log_{10} (I_{490}/I_{420})$ of 300 purple, normal and bright yellow (PNBY) and 300 bright-greenish-yellow (BGY) nuts from each of three 50 kg lots (a total of 1800 nuts). Min. errors of classification for test data were achieved for arbitrary discrimination values ('cuts') at 0.18, 0.19, 0.21 and 0.19 for lots 1, 2, 3 and combined lot resp., with total classification errors of 20.4, 15.4, 4.0 and 13.9% resp. The performance of the photometer was based on the assumption that visual classification was correct. The dual-wavelength fluorescence photometer is currently being incorporated into an automatic sorting machine, which may show a correlation between the amount of BGY and aflatoxin concn. RM

16

Survey for zearalenone, aflatoxin, and ochratoxin in US grain sorghum from 1975 and 1976 crops.

Shotwell, O. L.; Bennett, G. A.; Goulden, M. L.; Plattner, R. D.; Hesseltine, C. W.

Journal of the Association of Official Analytical Chemists 63 (4) 922-926 (1980) [16 ref. En] [N. Reg. Res. Cent., USDA, Peoria, Illinois 61604, USA]

Grain sorghum samples (197) from 10 States harvested in 1975 and 1976 were analysed for zearalenone, aflatoxin, and ochratoxin by the Eppley procedure. Zearalenone was detected in 56 samples (28%) at levels of 200-6900 ng/g (the detection limit was 100-200 ng/g). Zearalenone identity was confirmed in representative samples by GLC-MS of the trimethylsilyl derivatives. No ochratoxin was detected in any sample (the detection limit was about 50 ng/g). Aflatoxin was detected in 4 samples at levels of 54, 6, 10, and 7 ng total aflatoxin/g (the detection limit was approx. 3 ng/g). The identity of aflatoxin B_1 in the samples was confirmed by formation of the water adduct on TLC plates. AS

17

Insect damage, *Aspergillus flavus* ear mold, and aflatoxin contamination in South Georgia corn fields in 1977.
McMillian, W. W.; Wilson, D. M.; Widstrom, N. W.
Journal of Environmental Quality 7 (4) 564–566 (1978) [12 ref. En] [S. Grain Insects Res. Lab., USDA, Tifton, Georgia 31794, USA]

A survey of preharvest corn (*Zea mays* L.) in 31 counties in the Coastal Plain Region of Georgia suggested that ears moulded by the *Aspergillus flavus* group and ears damaged by insects were widespread in about 810 000 ha (2 million acres) of corn grown in the area. 90% of the field-collected samples contained alfatoxin in excess of 20 μg/kg. Average ear damage by insects ranged from a low of 1.4 cm to a high of 8.9 cm. Highly significant correlations were found between insect damage and % of ears with visible *A. flavus* ear mould, between insect damage and aflatoxin contamination, and between % of ears with visible *A. flavus* ear mould and alfatoxin contamination. AS

18

Detection of rubratoxin B and seven other mycotoxins in corn.
Whidden, M. P.; Davis, N. D.; Diener, U. L.
Journal of Agricultural and Food Chemistry 28 (4) 784–786 (1980) [22 ref. En] [Botany, Plant Path. Dep., Auburn Univ. Agric. Exp. Sta., Auburn, Alabama 36830, USA]

A method was developed for simultaneous extraction, separation, and qualitative analysis of rubratoxin B, aflatoxin B_1, diacetoxyscirpenol, ochratoxin A, patulin, penicillic acid, sterigmatocystin, and zearalenone in corn. Mycotoxins were extracted with acetonitrile, sequentially eluted from a silica gel minicolumn, and visualized by TLC methods. Rubratoxin B was quantitatively measured, using the TLC solvent system acetonitrile/acetic acid (100:2, v/v), with as little as 10 mg toxin/kg corn being detected. Extraction and total efficiencies for rubratoxin B were approx. 66 and 31%, resp. Three new confirmation tests for rubratoxin B are reported: NH_4OH vapour intensified the fluorescence of a heat-produced derivative of rubratoxin B; chlorine/pyrazolinone/cyanide reagent reacted with rubratoxin B to produce a pink spot that rapidly changed to blue, following exposure to heat and NH_4OH; and prolonged heating of rubratoxin B on TLC plates in the presence of NH_4HCO_3 also produced a blue fluorescent derivative. AS

19

[Aflatoxin M_1 in milk and milk products. A comparison of some determination procedures.] Aflatoxin M_1 in Milch und Milchprodukten. Vergleich einiger Bestimmungsverfahren.
Miller, M.; Kiermeier, F.; Weiss, G.; Klostermeyer, H.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 171 (1) 20–23 (1980) [11 ref. De, en] [Inst. der Süddeutschen Versuchs- & Forschungsanstalt für Milchwirtschaft der Tech. Univ. München, Vottinger Strasse 45, D-8050 Freising-Weihenstephan, Federal Republic of Gemany]

Earlier experiments investigating the transfer of aflatoxin B from fodder into milk (as aflatoxin M_1) were repeated with a critical appraisal of methods [see FSTA (1975) 7 8P1678]. About 400 l milk contaminated with 4 μg aflatoxin M_1/l was converted to dried milk and Tilsit cheese, and samples were tested for aflatoxin M_1 by the conventional TLC method [FSTA (1976) 8 10P1958], and by MS, HPLC and optical methods. Major errors occurred in the TLC method because interfering substances with similar optical and chemical properties could not be separated from the aflatoxin M_1, which was difficult to identify and quantify even after additional clean-up on polystyrene columns. The resolving power of HPLC, however, using a 250 × 26 mm Perkin Elmer column filled with silica A 10 μm, yielded pure fractions which could be determined by their MS and UV spectra. In HPLC chromatograms of cheese extract, there was a broad peak at 6.2 min when a UV detector at 254 nm was used, and a sharp peak at 6.4 min when a fluorescence detector was used, but the eluate contained 2 compounds which both fluoresced at 410 nm when excited at 360 nm. In fluorimetric-detn. the total fluorescence intensity corresponded to an aflatoxin M_1 content of 6.5 μg/kg, but only 58.7% of the fluorescence was due to aflatoxin M_1, the true concn. of which was 3.9 μg/kg, according to the sharp peak at 6.4 min. ADL

20

[Aflatoxin B_1 detection by ELISA.] Nachweis von Aflatoxin B_1 mittels ELISA.
Biermann, A.; Terplan, G.
Archiv für Lebensmittelhygiene **31 (2) 51–57 (1980)** [many ref. De, en] [Inst. für Hygiene & Tech. der Lebensmittel Tierischen Ursprungs, Schellingstrasse 10, 8000 Munich 40, Federal Republic of Germany]

The detection of aflatoxin B_1 (AFB_1) by enzyme-linked immunosorbent analysis (ELISA) [see Lawellin et al., *Applied and Environmental Microbiology* (1977) 34, 94–96] is described. The detection requires preparation of specific antisera and enzyme-markings of the toxin and introduction of a reactive chemical group into AFB_1 to allow coupling reactions. As hapten for antibody production, AFB_1 was transformed to a *O*-carboxymethyl oxime which was coupled to human serum albumin (HSA) in a ratio of 32:1 and the AFB_1-HSA conjugate used to obtain antisera. For enzyme marking, AFB_1 oxime was coupled to horseradish peroxidase (HRP). Enzyme activity was assayed with 5-amino salicyclic acid as substrate. ELISA was performed with antibody-coated polystyrene tubes and micro titreplates as immunosorbent. Sequential titrimetric ELISA procedure (the unknown AFB_1 and known AFB_1-HRD competing in sequence for the binding centre of the solid phase) was much more sensitive than simultaneous incubation. The limit of detection for standard AFB_1 solution under optional conditions was 800 fg/ml. Antisera were highly specific, as the binding of AFB_1-HRF was inhibited by other aflatoxins only at very high concn. The special advantages of ELISA are high sensitivity and possible automation. Application to foods and feeds is under investigation. [From En summ.] RM

21

Application of preparative HPLC in the chemical analysis of food ingredients. [Lecture]
Tiebach, R. K. D.; Schramm, M.
Chromatographia 13 (7) 403-407 (1980) [En] [Max von Pettenkofer-Inst. des Bundesgesundheitsamtes, Unter den Eichen 82-84, D-1000 Berlin 45]

3 examples are described for the application of preparative HPLC in food chemistry; isolation of the β-tocopherol fraction from an oily tocopherol mixture; purification of a vitamin D-containing extract from instant chocolate powder, for further confirmation by MS and quantitative detn. of vitamin D_3; and purification and fractionation of an aflatoxin-containing extract from a groundnut sample, followed by MS analysis of individual fractions containing aflatoxin B, B_2, G_1 and G_2. The preparation of samples, preparative and quantitative HPLC chromatograms as well as the chemical ionization MS of the compounds isolated from the extracts by preparative HPLC are described. [See FSTA (1981) 13 3A108.] AS

22

Collaborative study of the effectiveness of the screening test on APA medium for aflatoxin producing aspergilli.
Jesenska, Z.; Polster, M.; Matyasova, J.; Polakova, O.
Zentralblatt für Bakteriologie, 1B 171 (4/5) 408-415 (1979) [47 ref. En, de] [Res. Inst. of Preventive Med., Limbova ul. 14, 809 58 Bratislava, Czechoslovakia]

252 strains of *Aspergillus flavus* isolated from foods were used in a study on the relation of results of screening (by culture on APA medium/testing for blue UV fluorescence) to the capability of the strains to produce aflatoxin when grown on Karlsbad biscuits at room temp. for 14 days. Tables of results are given. 144 samples were negative in the screening test and did not produce aflatoxin on biscuits. 46 samples were positive in the screening test and produced aflatoxin on biscuits. 5 were positive in the screening test but did not produce aflatoxin on biscuits; 20 were negative in the screening test, but produced aflatoxin on biscuits. 29 samples gave doubtful fluorescence in the screening test. A much higher proportion of strains of tropical origin than of samples of central European origin were toxigenic. Overall, the screening test proved accurate for 92% of strains, and is therefore recommended for routine use. AJDW

23

In vivo covalent binding of aflatoxin metabolites isolated from animal tissue to rat-liver DNA.
Jaggi, W.; Lutz, W. K.; Luthy, J.; Zweifel, U.; Schlatter, C.
Food and Cosmetics Toxicology 18 (3) 257-260 (1980) [14 ref. En] [Inst. für Toxikol. der Eidg. Tech. Hochschule, CH-8603 Schwerzenbach, Switzerland]

Ring-labelled [^{14}C]aflatoxin B_1 (AFB_1), prepared by biosynthesis, or generally labelled [^{3}H]AFB_1 was administered by oral gavage to young adult male rats. The macromolecules and water-soluble conjugates of AFB_1 were isolated from the liver and administered orally to other rats to determine the incorporation of radioactivity into the liver DNA of the second group of rats. This binding can be used as an indicator for carcinogenic potency. In no case was radioactivity detected on the DNA. It is therefore concluded that the carcinogenic risk for humans who consume liver or meat containing aflatoxin residues is negligible when compared with the risk from intake of aflatoxins in other food items. [See also following abstr.] VJG

24

Metabolism and tissue distribution of [^{14}C]aflatoxin B_1 in pigs.
Lüthy, J.; Zweifel, U.; Schlatter, C.
Food and Cosmetics Toxicology 18 (3) 253-256 (1980) [23 ref. En] [Inst. für Toxikol. der Eidg. Tech. Hochschule, CH-8603 Schwerzenbach, Switzerland]

Excretion of radioactive aflatoxin B_1 and its metabolites over a 9-day period following the oral administration of ring-labelled [^{14}C]aflatoxin B_1 was investigated in pigs. % of dose of aflatoxin B_1 excreted was: faeces, 51-65%; urine, <20%. Highest ^{14}C activities were in the liver, kidney and lung 1 and 2 days after dosage. <90% of the radioactivity in the liver tissue was neither dialysable nor extractable with methylene chloride. [See also preceding abstr.] VJG

25

On the occurrence of mycotoxins (aflatoxins and zearalenone) in some foods and feeds, in Italy]. (In *'Food microbiology and technology'* [see FSTA (1981) 13 3B17].) [Lecture]
Bottalico, A.
pp. 337-346 (1979) [many ref. En, it] [Cent. di Studio del Consiglio Nazionale delle Ricerche su le Tossine, Istituto di Patologia Vetale dell'Univ., Bari, Italy]

Investigations on the occurrence of aflatoxins, zearalenone and associated toxigenic fungi in foods and feeds imported to or produced in Italy, were carried out during the last 3 yr. Samples of finished commercial almonds, i.e. whole, peeled, sliced and diced almonds, almond meals and a few samples of some feedstuffs were analysed for aflatoxins. Traces or low concn. of aflatoxins were found in 3 samples of almond meals (about 5-10 µg/kg) and in some samples of maize (about 5-10 µg/kg), soybean meals (about 20 µg/kg), wheat, chick-pea and carob (about 20-50 µg/kg), whereas higher concn. were found in meals or oil-cakes of sunflower (from 20 to 100 µg/kg), flax (about 100 µg/kg) and peanut (about 200 µg/kg). Samples of commercial cereal grains or meals, and freshly harvested maize and wheat grains were analysed for zearalenone. The toxin was found in 3 samples of imported maize (from 0.4 to 2 mg/kg) and in a few samples of maize collected at harvest time (from traces to 0.24 mg/kg) or in maize grains taken from ears infected by *Fusarium graminearum* (≤42 mg/kg). Zearalenone production in vitro by 98 *Fusarium* isolates, belonging to 9 spp., collected from cereals all over Italy was also assessed. The toxin was produced by *Fusarium graminearum*, *F. culmorum* and, to a much lesser extent, by *F. moniliforme*. AS

26

Mycotoxins in nutrition.
Towers, N. R.
Proceedings of the Nutrition Society of Australia **4,** 72–79 (1979) [8 ref. En] [Ruakura Anim. Res. Sta., Private Bag, Hamilton, New Zealand]

Aspects discussed are the widespread occurrence of mycotoxins, food losses due to mycotoxins, livestock losses due to mycotoxicoses, and the control of mycotoxicoses. The importance of preventing mycotoxicoses is stressed, because of the cost to food supplies and to human and animal health. Established control procedures and current research aimed at controlling facial eczema (caused by the toxin sporidesmin from *Pithomyces sp.*) in livestock are considered. AL

27

Effects of mycotoxins on mixed-function oxidase and adenosine triphosphatase systems in neonatal rats. I. Aflatoxin B_1/rubratoxin B.
Phillips, T. D.; Siraj, M Y.; Hayes, A. W.
Food and Cosmetics Toxicology 18 (3) 261–266 (1980) [30 ref. En] [Dep. of Pharmacol. & Toxicol., Univ. of Mississippi, Jackson, Mississippi 39216, USA]

28

International mycotoxin check sample program. I. Report on the performance of participating laboratories.
Friesen, M. D.; Walker, E. A.; Castegnaro, M.
Journal of the Association of Official Analytical Chemists 63 (5) 1057–1066 (1980) [30 ref. En] [Int. Agency for Res. on Cancer, 150 Cours Albert Thomas, 96372 Lyon Cedex 2, France]

3 aflatoxin-contaminated samples, raw peanut meal, finished peanut butter, and white corn meal, were analysed by 139 laboratories in 34 countries. Sufficient data were obtained to permit a statistical comparison of the performance of laboratories using the BF, CB, and Pons methods and those using HPLC for quantification. A raw peanut meal sample showed no significant differences among means for laboratories using the 4 methods, and a white corn meal sample showed only 1 such significant difference; however, a finished peanut butter sample containing < 10 µg total aflatoxins/kg showed 10 significant differences among means for laboratories using the 4 methods considered. AS

29

"New mycotoxins" and their potential significance in foods.
Ciegler, A.
Journal of Food Safety 2 (2) 75–85 (1980) [37 ref. En] [S. Reg. Res. Cent., SEA, USDA, New Orleans, Louisiana 70179, USA]

Mycotoxins (excluding aflatoxin), e.g. zearalenone, trichothecenes, tremorgens, ochratoxin, cyclopiazonic acid, xanthomegnin, cytochalasin, secalonic acid, and PR toxin, are discussed as potential food contaminants. Diseases possibly caused by unknown mycotoxins are discussed. LH

30

[Aflatoxins in olive-tree products.]
Gracian, F.; Arevalo, G.
Grasas y Aceites 31 (3) 167–171 (1980) [8 ref. Es, de, en fr] [Inst. de la Grasa y sus Derivados, Seville, Spain]

The development of aflatoxins during storage of olives and olive foot cakes was studied during 136 and 171 days in brick-built silos. Tabulated results showed moderate contamination, aflatoxins appearing after 64 days storage: 155.4 g/kg in olives, falling to 45.2 at 136 days; 32.4 in pressure-extracted oil, falling to 13.0 at 136 days; and 54.2 in foot cakes, falling to 13.4 at 171 days (figures are for total aflatoxins). No aflatoxin was detected in hexane-extracted oil from the foot cakes. RM

31

Determination and confirmation of identity of aflatoxin M_1 in dairy products: collaborative study.
Stubblefield, R. D.; Egmond, H. P. van; Paulsch, W. E.; Schuller, P. L.
Journal of the Association of Official Analytical Chemists 63 (4) 907–921 (1980) [19 ref. En] [Reg. Res. Cent., USDA, Peoria, Illinois 61604, USA]

An international collaborative study involving 23 collaborators was conducted to test methods, improved over previous methods with respect to speed and solvent use, for rapid detn. and TLC confirmation of aflatoxin M_1 identity in dairy products. For the quantitative method, collaborators assayed samples of Gouda and Cheddar cheeses, dried milk, and butter containing levels of M_1 near the anticipated limit of detn. Statistical analysis of the study results indicated that the lower limit of detn. and precision of this method were comparable to these parameters of methods previously approved for analysis for aflatoxin M_1. A few collaborators found that M_1 eluted early from cleanup columns with cheese and butter samples and that emulsions formed during dried milk sample extraction. The reasons for these problems have been determined and remedies are provided. For the TLC confirmation of identity method, collaborators prepared trifluoroacetic acid derivatives of M_1 on the plates after 2-dimensional development. Concn. as low as 0.3 ng/g cheese and 1.0 ng/g dried milk were determined in this study. As a result of this study, both methods have been adopted as official first action methods by the AOAC and as reference methods by IUPAC. AS

32

Rapid method for analysis of aflatoxin M_1 in dairy products.
Fukayama, M.; Winterlin, W.; Hsieh, D. P. H.
Journal of the Association of Official Analytical Chemists 63 (4) 927–930 (1980) [19 ref. En] [Dep. of Environmental Toxicol., Univ. of California, Davis, California 95616, USA]

4 methods for determining aflatoxin M_1 levels in fluid milk were compared in a search for a simple, routine analytical procedure. Each method was tested with samples spiked at levels of 0, 0.1, 0.5, and 1.0 ng/ml. The 3 quantitative methods were comparable in sensitivity (0.1 ng/ml) and recoveries (80–90%). A new method, using a commercially available extraction column that contains an inert hydrophilic matrix to permit

extraction of dairy products, is described. The milk is adsorbed on the column and aflatoxin M_1 is eluted with chloroform/acetone (9 + 1). The extract is further purified on a small silica gel column and aflatoxin M_1 is determined by TLC. This method was simpler and shorter, and was equally sensitive and reproducible in determining aflatoxin M_1 in spiked and naturally contaminated fluid milk samples and in spiked dried skim, condensed, and evaporated milk. AS

33

Thin layer chromatographic determination of aflatoxins in dry ginger root and ginger oleoresin.
Trucksess, M. W.; Stoloff, L.
Journal of the Association of Official Analytical Chemists 63 (5) 1052–1054 (1980) [5 ref. En] [Div. of Chem. & Physics, FDA, Washington, DC 20204, USA]

A method for determining aflatoxins in dry ginger root and ginger oleoresin, using 1-dimensional TLC for the determinative step, was developed. The key cleanup steps that permit this change from the 2-dimensional TLC previously required are partitioning of the extract with carbon tetrachloride and use of an improved eluting system for the silica gel adsorption column. Recoveries of aflatoxins B_1, B_2, G_1, and G_2 added to samples of ground ginger were 82, 101, 106, and 110%, resp.; recoveries of these aflatoxins added to ginger oleoresin were 75, 100, 93, and 125%, resp. The method is applicable to fish meal and a number of mixed feeds. AS

34

[Toxic metabolites produced by *Aspergillus egyptiacus.*]
Moubasher, A.-A. H.; El-Kady, I. A.; Gabry, M. S. E.; Shoreit, A. A.
Pakistan Journal of Scientific and Industrial Research 22 (1/2) 50–54 (1979) [16 ref. En] [Assiut Univ., Assiut, Egypt]

The toxicity of a crude chloroform extract of *A. egyptiacus* was examined through histological and histochemical effects in mice, and inhibition of the growth of some bacteria and fungi. RM

35

Effect of aflatoxin B_1 on germination, respiration and α-amylase in maize.
Misra, R. S.; Tripathi, R. K.
Zeitschrift für Pflanzenkrankheiten und Pflanzenschutz 87 (3) 155–160 (1980) [26 ref. En, de] [G. V. Pant Univ. of Agric. & Tech., Pantnagar, Nainital 263145, India]
Aflatoxin B_1 inhibited the germination of maize seeds with an ED_{50} dose [lowest level dose] of 25 μg/ml, inhibited respiration with a 7 h lag period, and inhibited α-amylase activity in conjunction with actinomycin D (but not by itself). Based on these and other data, it is suggested that the toxin inhibits respiration by inhibiting the induced α-amylase synthesis, thus blocking the availability of the C source. [From En summ.] RM

36

[Behaviour of aflatoxin M_1 during Camembert cheesemaking.]
Fremy, J. M.; Roiland, J. C.
Annales de la Nutrition et de l'Alimentation 33 (5) 619–630 (1979) [10 ref. Fr, en] [Min. de l'Agric., Services Vet., 43 Rue de Dantzig, 75015 Paris, France]

Camembert cheese was made by classical methods from raw milk spiked with 7.5, 3.0 and 0.3 μg aflatoxin M_1/l. Of the toxin, 64.4, 52.9 and 42.3%, resp. was recovered in the whey, and 35.6, 47.1 and 57.7%, resp. in the curds. During the first 15 days of storage the aflatoxin M_1 content of the cheeses fell by 25, 55 and 75%, resp. from the initial levels. Trials with ^{14}C-labelled aflatoxin M_1, showed 60.6% in the whey, 39.4% in the curds, but no change in ^{14}C activity of DM during 30 days' ripening of the cheese. RM

37

[Screening method for determination of various mycotoxins in food.] Verfahren zur Bestimmung verschiedener Mykotoxine in Lebensmitteln.
Gertz, C.; Böschemeyer, L.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 171 (5) 335–340 (1980) [19 ref. De, en] [Chem. Untersuchungsamt der Stadt Hagen, Pappelstrasse 1, D-5800 Hagen, Federal Republic of Germany]

A simple analytical method for multiple mycotoxins was developed for detecting aflatoxin B_1, B_2, G_1, G_2, M_1, and M_2, sterigmatocystin, penicillin acid, ochratoxin A and patulin. These mycotoxins were extracted with ethyl acetate. The extract was cleaned up by chromatography on silica mini-column. Each fraction was separated by TLC. The final evaluation of the TLC-plates was carried out by fluorodensitometry. A considerable increase in fluorescence intensity was achieved by spraying the plates with paraffin after development. The detection limits of fluorescent mycotoxins and the fluorescent derivates of penicillic acid and sterigmatocystin were lowered to 1:10 up to 1:100. Spots of patulin were measured by fluorescence quenching. AS

38

Aflatoxin control: past and present.
Stoloff, L.
Journal of the Association of Official Analytical Chemists 63 (5) 1067–1073 (1980) [4 ref. En] [Div. of Chem. & Physics, FDA, Washington, DC 20204, USA]

History of control of aflatoxin levels in foods, especially peanut products, in the USA is surveyed, and tabulated data show changes in aflatoxin contamination from 1967 to 1978 for raw shelled peanuts, consumer peanut products, almonds, pecans and walnuts, and imported Brazil and pistachio nuts; the products mentioned are those most susceptible to aflatoxin contamination. In addition the effect of establishment of an FDA action level of 0.5 ng aflatoxin M_1/ml milk on aflatoxin concn. in market milk is discussed. It is considered that aflatoxin contamination of food is effectively controlled in the USA, with the possible exception of some cornmeal and corn grits products locally made and consumed in rural S.E. areas. DIH

39

Influence of temperature cycling on the production of aflatoxins B_1 and G_1 by *Aspergillus parasiticus*.
Lin, Y. C.; Ayres, J. C.; Koehler, P. E.
Applied and Environmental Microbiology 40 (2) 333–336 (1980) [13 ref. En] [Dep. of Food Sci., Univ. of Georgia, Athens, Georgia 30602, USA]

The effect of temp. cycling on the relative productions of aflatoxins B_1 and G_1 by *Aspergillus parasiticus* NRRL 2999 was studied. Cycling of temp. between 33 and 15°C favoured aflatoxin B_1 accumulation, whereas cycling between 25 and 15°C favoured aflatoxin G_1 production. Cultures subjected to temp. cycling between 33 and 25°C at various time intervals changed the relative productions of aflatoxins B_1 and G_1 drastically. Results obtained with temp. cycling and yeast extract-sucrose medium with ethoxyquin to decrease aflatoxin G_1 production suggest that the enzyme system responsible for conversion of aflatoxin B_1 to G_1 might be more efficient at 25° than at 33°C. The possible explanation of the effect of both constant and cycling temp. on the relative accumulations of aflatoxins B_1 and G_2 might be through the control of the above enzyme system. The study also showed that $>57\%$ of aflatoxin B_1, $>47\%$ of aflatoxin G_1, and $>50\%$ of total aflatoxins (B_1 plus G_1) were in the mycelium by day 10 under both constant and cyclic temp. conditions. AS

40

Inhibition of *Aspergillus* growth and aflatoxin release by derivates of benzoic acid.
Chipley, J. R.; Uraih, N.
Applied and Environmental Microbiology 40 (2) 352–357 (1980) [22 ref. En] [Dep. of Poultry Sci. Ohio State Univ., Columbus, Ohio 43210, USA]

A study was conducted to determine the effect of *o*-nitrobenzoate, *p*-aminobenzoate, benzocaine, ethyl benzoate, methyl benzoate, salicylic acid, *trans*-cinnamic acid, *trans*-cinnamaldehyde, ferulic acid, aspirin, and anthranilic acid on growth and aflatoxin release in *A. flavus* NRRL 3145 and *A. parasiticus* NRRL 3240. Inhibition of mycelial growth and aflatoxin release by various concn. of the above-named aromatic compounds may indicate the possibility of their use as fungicides. However, further investigation is needed to determine the possible toxic effects of any aromatic residues. At concn. of 2.5 and 5.0 mg/25 ml medium, methyl benzoate and ethyl benzoate were the most effective in reducing both mycelial growth and aflatoxin release. AL

41

Aflatoxin: past, present and future.
Coker, R. D.
Tropical Science 21 (3) 143–162 (1979) [31 ref. En, fr, es] [Tropical Products Inst., 56/62 Gray's Inn Road, London WC1X 8LU, UK]

The topic is reviewed under the following headings: susceptible commodities (groundnuts, maize); toxicity of the aflatoxins (acute and chronic toxicity); natural occurrence of aflatoxicosis;

studies); detection of aflatoxin in food and feeds (sampling and analysis): overcoming aflatoxin contamination (prevention and cure): and aflatoxin in the future. VJG

42

A water slurry method of extracting aflatoxin from peanuts.
Withaker, T. B.; Dickens, J. W.; Monroe, R. J.
Journal of the American Oil Chemists' Society 57 (9) 269–272 (1980) [6 ref. En] [USDA, SEA, AR, N. Carolina State Univ., Raleigh, N. Carolina 27607, USA]

A water slurry method in which 1100 g comminuted peanuts was blended with 1500 ml tap water for 3 min in a blender and the aflatoxin in a 130-g portion of the water slurry was extracted by solvent according to methods similar to those used in Method II of AOAC was compared to the method presently used by the Food Safety and Quality Service, USDA. The proposed water slurry method requires only 180 and 60 ml/sample, resp., of methanol and hexane compared to the 1650 and 1000 ml, resp., required by the FSQS method. Blending comminuted peanuts with water reduced the average particle size and distributed the contaminated particles throughout the slurry. 94% of the blended particles passed a sieve with 149-µm openings compared to only 66% of the unblended product. Variance among analyses with the FSQS method did not differ significantly from the variance among analyses with the slurry method. However, analyses with the slurry method averaged 16% more aflatoxin than with the FSQS method. AS

43

Toxic aspergilli from pistachio nuts.
Mojtahedi, H.; Rabie, C. J.; Lübben, A.; Steyn, M.; Danesh, D.
Mycopathologia 67 (2) 123–127 (1979) [21 ref. En] [Dep. of Horticulture, Univ. of Isfahan, Isfahan, Iran]

Pistachio nut samples taken during various stages of development from orchards in Iran, showed that contamination with fungi occurred mainly during the later stages of nut development. Members of the genera Aspergillus and Penicillium occurred most frequently. Of the Aspergilli, the spp. *A. niger*, *A. flavus* and *A. fischeri* var. *spinosus* occurred most frequently, followed by *A. terreus*, *A. tamarii* and *A. nidulans*. 22 isolates comprising 13 spp. were tested for toxicity to ducklings. Isolates of known toxic fungi included *A. flavus*, *A. niger*, *A. parasiticus*, *A. ochraceus*, *A. versicolor*, *A. nidulans* and *A. terreus*. The toxicity of *A. fischeri* var. *spinosus* is reported. Chemical analysis showed that all isolates of *A. flavus* and *A. parasiticus* produced aflatoxin B_1, the isolates of *A. versicolor* and *A. nidulans* produced sterigmatocystin while the toxic isolate of *A. ochraceus* did not produce ochratoxins. AS

44

[Marzipan, its manufacture and processing.]
Marzipan, seine Herstellung und Verarbeitung.
Bocklet, G.
Brot & Backwaren 28 (7/8) 19, 22–23 (1980) [De]

Official guidelines for the composition of marzipan are discussed, with reference to max. moisture, sugar and almond oil levels. Characteristics of high-quality marzipan are given, and differences between it and persipan and persipan raw mass are presented. Various processing methods are briefly considered. Standard composition of a marzipan-macaroon mass is given and differences between various marzipan types are discussed. Bacteriological aspects are also considered, together with the Federal German Aflatoxin Regulations of 1 March 1977. IN

45

A physical method for the segregation of aflatoxin-contaminated corn.
Huff, W. E.
Cereal Chemistry 57 (4) 236–238 (1980) [23 ref. En] [Dep. of Agric., USDA, RD 2, Box 600, Georgetown, Delaware 19947, USA]

2 lots of corn differing in the degree of aflatoxin contamination (527 and 3317 ng/g) were used to evaluate a process to separate aflatoxin-contaminated from uncontaminated corn. The 2 lots were segregated into buoyant and nonbuoyant portions in water and in 3 sucrose solutions (20, 30 and 40%). Removing corn buoyant in water resulted in a 60% reduction in the level of aflatoxin through the removal of 22% of the corn. Improved ability to segregate aflatoxin-contaminated from uncontaminated corn was exhibited through the graded increase in densities of the sucrose solutions. Removing 53% of the corn with 40% sucrose reduced the aflatoxin level by approx. 90%. These data show that aflatoxin-contaminated and uncontaminated corn differ in density. This difference in density may have practical application in aflatoxin detection and in separation of contaminated from uncontaminated corn. AS

46

Aflatoxin contamination of preharvest corn: role of *Aspergillus flavus* inoculum and insect damage.
Lillehoj, E. B.; Kwolek, W. F. K.; Horner, E. S.; Widstrom, N. W.; Josephson, L. M.; Franz, A. O.; Catalano, E. A.
Cereal Chemistry 57 (4) 255–257 (1980) [7 ref. En] [S. Reg. Res. Cent., USDA, New Orleans, Louisiana 70179, USA]

12 corn hybrids (*Zea mays* L.) were planted in Florida, Georgia, and Tennessee on 2 dates during 1978 to examine the interaction between hybrids, field environments, planting date, and *A. flavus* infection of developing kernels. At harvest, a broad occcurrence of aflatoxin was observed in the samples, with no significant differences among hybrids. Silk channels of treated ears were inoculated with *A. flavus* spores; kernels from the inoculated ears exhibited significantly higher levels of toxin than did those of the controls. Insect damage of ears was assessed at harvest by visual examination; a trend of increased toxin levels was associated with greater damage. Presence of bright greenish yellow fluorescence in corn samples was closely linked to the occurrence of high levels of aflatoxin (>300 ng/g), but corn samples with no detectable toxin also routinely exhibited fluorescencing particles. AS

47

Aflaetoxin: distribution in contaminated corn plants.
Shotwell, O. L.; Goulden, M. L.; Hesseltine, C. W.; Dickens, J. W.; Kwolek, W. F.
Cereal Chemistry 57 (3) 206–208 (1980) [9 ref. En] [N. Reg. Res. Cent., USDA, Peoria, Illinois 61604, USA]

The kernels, cobs, husks, leaves, and stalks of 50 corn plants from a field heavily infested with *Aspergillus flavus* were analysed for aflatoxin. The toxin was not detected in any of the analysed parts of seven plants. Aflatoxin was detected in the kernels of 42 plants at levels of 2–18 300 µg/kg. The cobs of 24 plants, all of which had contaminated kernels, contained aflatoxin (range: 1–260 µg/kg). The toxin was detected at lower levels in husks (1–91 µg/kg) of 29 plants, leaves (2–70 µg/kg) of 19 plants, and stalks (1–146 µg/kg) of 20 plants; all of these plants but one contained aflatoxin in the kernels. One plant had aflatoxin (5 µg/kg) only in the husks. AS

48

Survey of 1977 Midwest corn at harvest for aflatoxin.
Shotwell, O. L.; Bennett, G. A.; Goulden, M. L.; Shannon, G. M.; Stubblefield, R. D.; Hesseltine, C. W.
Cereal Foods World 25 (1) 12, 14 (1980) [10 ref. En] [N. Reg. Res. Cent., Agric. Res., Sci. & Education Administration, USDA, Peoria, Illinois 61604, USA]

923 Midwest corn samples collected in Illinois, Indiana, Iowa, Kansas, Missouri, Nebraska, Ohio and Wisconsin in 1977, were examined for aflatoxin. Samples were also examined before shelling for *Fusarium* damaged ears. 47 samples with the most severely damaged ears were analysed for zearalenone. Only 3 of the 923 corn samples analysed had aflatoxin levels >20 parts/billion (p.p.b.) (the FDA guideline for aflatoxin in corn) an incidence of 0.3%. Of the positive samples >20 p.p.b., 2 (30 and 151 p.p.b.) came from Missouri and 1 (42 p.p.b.) from Kansas. No aflatoxin positive samples were found in samples from Illinois, Indiana, Nebraska, Ohio or Wisconsin. The incidence of detectable toxin was 0.6%. Of the cracked samples examined for bright greenish yellow (BGY) particles associated with *Aspergillus flavus* and possible aflatoxin, 79% had no BGY, 17% had 1 BGY particle and 3% had at least 2 BGY particles/kg. Almost all the corn samples (914) had some *Fusarium* damage; 431 had fewer than 10% damaged ears. Only 70 of the samples had >49% ears damaged by visible *Fusarium* growth. No zearalenone was detected in any of the 47 samples analysed. VJG

49

Storage of groundnut oil detoxified by exposure to sunlight.
Shantha, T.; Sreenivasa Murthy, V.
Indian Journal of Technology 18 (8) 346–347 (1980) [3 ref. En] [Cent. Food Tech. Res. Inst., Mysore-570 013, India]

Aflatoxin in groundnut oil, after being degraded by sunlight, was not regenerated during storage for 6 months of the oil in dark. There was some increase in peroxide value, but the organoleptic quality of the oil remained unchanged during 3 months of storage. CFTRI

50

Rapid detection of aflatoxin M_1 in milk by reversed-phase high-performance thin-layer chromatography.
Biondi, P. A.; Gavazzi, L.; Ferrari, G.; Maffeo, G.; Secchi, C.
Journal of High Resolution Chromatography and Chromatography Communications 3 (2) 92 (1980) [1 ref. En] [Istituto di Fisiologia Vet. & Biochimica, Via Celoria 10, 20133, Milan, Italy]

A fast method is described for detection of aflatoxin M_1 in milk, with detection limit 0.1 ng, by reversed-phase high performance TLC. It involves a preliminary run with methanol/H_2O (20:1) followed by a perpendicular separation of aflatoxin M_1 with methanol/H_2O (4:1), and UV examination. RM

51

High pressure liquid chromatographic determination of aflatoxins in soy sauce and fermented soybean paste.
Wei, R. D.; Chang, S. C.; Lee, S. S.
Journal of the Association of Official Analytical Chemists 63 (6) 1269–1274 (1980) [16 ref. En] [Dep. of Biochem., Nat. Yang-Ming Med. Coll., Shih-Pai, Taipei, Taiwan, China]

A procedure for quantitative detn. of aflatoxins B_1, B_2, G_1, and G_2 in soy sauce and fermented soybean paste is proposed using HPLC with UV detection after CB extraction and SEP-PAK and preparative TLC cleanups. Recoveries of 71.3 to 89.3% were obtained for soy sauce spiked with 1, 5, 20, and 100 parts/billion (p.p.b.) aflatoxins. Similar recoveries (77.0–90.8%) were obtained with conc. soy sauce and fermented soybean paste spiked at 20 and 100 p.p.b. The proposed procedure is relatively fast and precise and gives good recoveries. Aflatoxins were not stable in soy sauce. During storage, half of aflatoxins B_1 and G_1 deteriorated at 60 and 120 days, resp. AS

52

Growth and biosynthesis of aflatoxin by *Aspergillus parasiticus* in cultures containing nisin.
Yousef, A. E.; El-Gendy, S. M.; Marth, E. H.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 171 (5) 341–343 (1980) [14 ref. En, de] [Dep. of Food Sci. Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Nisin, 200 or 5000 Reading units/ml, was added to *Aspergillus parasiticus* cultures. The cultures were incubated at 28°C for 3, 7 or 10 days and analysed for mycelial dry wt., pH and accumulation of aflatoxins B_1 and G_1. During the first 3 days of incubation, dry wt., pH decrease and aflatoxin accumulation were suppressed by nisin, when compared with similar values for the nisin-free control. After longer incubation, differences in dry wt. and pH values decreased, whereas accumulation of aflatoxin in the nisin-containing cultures surpassed that of the control. AS

53

Proceedings of a third meeting on mycotoxins in animal disease, held at the National College of Food Technology, Weybridge, 17–18 April 1978.
[Conference proceedings]
Pepin, G. A.; Patterson, D. S. P.; Shreeve, B. J. (**United Kingdom,** Ministry of Agriculture, Fisheries & Food, Agricultural Development & Advisory Service) (Editors)
viii + 82pp. (1979) [many ref. En] Pinner, Middlesex, UK; Ministry of Agriculture, Fisheries & Food. Price £5.85

The 19 papers presented at this meeting are divided into 4 sections: the natural occurrence of mycotoxins; methods of analysis for mycotoxins; animal diseases possibly associated with feed-borne mycotoxins; and public health implications of mycotoxins. Papers included: Moulds and mycotoxins in animal foodstuffs – reports of ADAS microbiologists, by R. Syrett (pp. 4–7). Fungi and mycotoxins detected in samples from the infestation control service 1976–77, and recent laboratory experiments on mycotoxins at PICL, by J. H. Clarke & E. V. Niles (pp. 8–12, 4 ref.; includes a table on mycotoxins detected in cereals, cereal products, pulses and pulse products, oilseeds, oilseed products, dried fruit and fruit products, spices, condiments and flavourings, cocoa beans and cocoa products). Food surveillance in the UK and abroad [report of a working party on mycotoxins, set up in 1975], by D. G. Lindsay (pp. 13–15, 7 ref.; projects which have already been commissioned and for which results are just beginning to be available include incidence and level of aflatoxins in edible nuts, mycotoxins in flour and oatmeal, maize and maize products, meat and meat products, coffee and cocoa, pulses, fruit juices and products, mould-spoiled food, and levels and incidence of aflatoxin M_1 in dairy products). The use of gas chromatography/mass spectrometry for the detection of some mycotoxins, by D. T. Coxon & K. R. Price (pp. 23–24, 5 ref.). The development of extraction and high performance liquid chromatography methods of analysis for mycotoxins, by J. P. Chaytor & M. J. Saxby (pp. 25–27, 9 ref.). The use of high performance liquid chromatography for the measurement of mycotoxin in food, by N. T. Crosby & D. C. Hunt (pp. 34–36, 6 ref.). Aflatoxin in animal feedstuffs and its 'carry-over' into food products, by D. S. P. Patterson (pp. 71–72, 4 ref.). [See also FSTA (1981) 13 6P1046.] DMK

54

Mycotoxins. [Review]
Mirocha, C. J.; Pathre, S. V.; Christensen, C. M.
Advances in Cereal Science and Technology **3**, 159-225 (1980) [many ref. En] [Dep. of Plant Path., Univ. of Minnesota, St Paul, Minnesota, USA]

Aspects covered in this comprehensive review are: introduction (definition of mycotoxins, occurrence, fungi that produce mycotoxins); aflatoxins, dealing with their role in public and animal health, chemical and physical properties, naturally occurring derivatives, biosynthesis, metabolism, molecular basis of action, occurrence in foodstuffs, and control and detoxification; zearalenones, dealing with the fungus and conditions for production, chemical composition, derivatives and properties, methods of analysis, and natural occurrence; trichothecenes, dealing with chemical composition and properties, method of analysis, natural occurrence, biosynthesis, molecular mode of action, and toxicity; ochratoxin, including occurrence, properties, analysis methods, toxicity, and biosynthesis; and other mycotoxins, covering patulin, yellowed-rice toxins, tremorgenic toxins and rubratoxin. 15pp. of ref. are included. [See FSTA (1981) 13 6M574.] AL

55

Quantitation of aflatoxin B_1 and aflatoxin B_1 antibody by an enzyme-linked immunosorbent microassay.
Pestka, J. J.; Gaur, P. K.; Chu, F. S.
Applied and Environmental Microbiology 40 (6) 1027-1031 (1980) [21 ref. En] [Food Res. Inst., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

A specific microtest plate enzyme immunoassay was developed for rapid quantitation of aflatoxin B_1 at levels as low as 25 pg per assay. Details for optimal conditions of the new aflatoxin microplate ELISA are given. The method may be a safer and more reliable procedure for routine assay of aflatoxin B_1 than previous immunoassays. AL

56

Influence of inoculum size of *Aspergillus parasiticus* spores on aflatoxin production.
Sharma, A.; Behere, A. G.; Padwal-Desai, S. R.; Nadkarni, G. B.
Applied and Environmental Microbiology 40 (6) 989-993 (1980) [21 ref. En] [Biochem. & Food Tech. Div., Bhabha Atomic Res. Cent., Bombay 400 085, India]

The influence of inoculum size on growth and aflatoxin production was examined in *Aspergillus parasiticus* (NRRL 3145) using a synthetic medium. The reduction in the number of spores by 4-5 log cycles either by serial dilution or by γ-irradiation caused a 2-fold increase in toxin production. The decrease in the inoculum size induced a lag in growth of the culture, though the final yield of the mycelium over the 28-day experimental period was the same. The max. accumulation of aflatoxin was observed on day 14 of incubation. A transition from the biphasic to monophasic pattern in aflatoxin production could be correlated with the size of the inoculum. The enhanced toxin production from dilute inocula was similar to that obtained with the surviving fraction of the spores after γ-irradiation (0-150 krad). AS

57

Effect of phenolic antioxidants on the mutagenicity of aflatoxin B_1.
Shelef, L. A.; Chin, B.
Applied and Environmental Microbiology 40 (6) 1039-1043 (1980) [28 ref. En] [Food Sci. & Human Nutr Wayne State Univ., Detroit, Michigan 48202, USA]

The Ames assay employing *Salmonella typhimurium* TA100 and TA98 was used to investigate potential interactions between aflatoxin B_1 (AFB_1) and the phenolic antioxidants butylated hydroxytoluene (BHT), butylated hydroxyanisole (BHA), and propyl gallate. AFB_1 doses were within the linear response range, and the antioxidants were used at levels of 0-50 μg/plate. All 3 antioxidants were nonmutagenic in either bacterial tester strain, with or without the hepatic S-9 enzyme preparation; toxic effects were observed at doses >20 μg/plate. BHT and BHA substantially increased AFB_1-induced mutagenesis in the 2 tester strains with microsomal activation. Addition of 5-20 μg BHT or BHA to 5-20 ng of AFB_1/plate caused >2× increase in the number of His^+ revertants. Addition of propyl gallate resulted in only a moderate increase in the number of revertants. Whereas several anticarcinogenic and antimutagenic effects by phenolic antioxidants have been reported, particularly in studies with polycyclic aromatic hydrocarbons, the enhancement of mutagenic potency of AFB_1 by these compounds suggests a specificity with respect to the chemical nature of AFB_1. AS

58

Development of a sensitive high-performance liquid chromatographic method for detection of aflatoxins in pistachio nuts.
Haghighi, B.; Thorpe, C.; Pohland, A. E.; Barnett, R.
Journal of Chromatography 206 (1) 101-108 (1981) [16 ref. En] [Biol. Res. Lab., Syracuse Univ., 130 Coll. Place, Syracuse, New York 13210, USA]

A very sensitive method is described for detection of aflatoxins in pistachio nuts. The method uses the extraction procedure used in the BF method [see *AOAC Official Methods of Analysis* Ed. 12 (1975) 26.020-26.024] followed by an acid alumina column clean-up to remove sample components which would otherwise interfere in the final detn. step. Quantitation of aflatoxins is by HPLC on a C18 reversed-phase column after conversion of aflatoxins B_1 and G_1 to their more fluorescent derivatives B_{2a} and G_{2a}. Detection limit was 0.5 μg/kg. The chromatograms were free of interfering peaks and multiple injections showed excellent reproducibility. 9 samples of pistachio nuts (one with no added aflatoxins, 6 to which aflatoxins B_1, B_2, G_1 and G_2 were each added at levels ranging from 0.5 to 18.0 μg/kg, and 2 naturally contaminated samples) were cleaned-up by the described procedure, and aflatoxins determined by TLC and by HPLC; recovery of total aflatoxins was 60-67% and 57-78%, resp. No loss of aflatoxins was caused by the alumina column clean-up step. AL

59

Aflatoxin production and loss in caloric value of maize seeds due to *Aspergillus parasiticus*.
Bilgrami, K. S.; Misra, R. S.; Sinha, K. K.
Current Science 48 (14) 642–643 (1979) [7 ref. En] [Post graduate Dep. of Bot., Bhagalpur Univ., Bhagalpur-812 007, Bihar, India]

Ganga-2 var. of maize (i) surface sterilized and (ii) autoclaved was inoculated with *Aspergillus parasiticus* and incubated at 28 ± 1°C and analysed for aflatoxin B_1 content at 2 day intervals up to 30 days. Calorie content was determined after 8 and 16 days of incubation. The aflatoxin started forming on 4th day in (i) and reached max. (15.80 mg/100 g) on 20th day and afterwards decreased to 14.16 mg/100 g, on 30th day. In (ii) aflatoxin was observed on 2nd day and reached max. on 16th day, afterwards it decreased to 18.8 mg/100 g on 30th day. Initial calorie content (kcal/g dry wt.) of 5.286 decreased to 4.784 after 16 days of incubation in (i). In (ii) the decrease was from 5.19 to 4.50 after 16 days. Percent decrease in calorie content of maize after 16 days of incubation was 9.47 in (i) and 13.25 in (ii). CFTRI

60

Mycotoxin and odor formation in moist cereal grain during granary storage.
Abramson, D.; Sinha, R. N.; Mills, J. T.
Cereal Chemistry 57 (5) 346–351 (1980) [25 ref. En] [Agric. Canada, Res. Sta., Winnipeg, Manitoba, R3T 2M9, Canada]

Half-bushel parcels of barley, wheat, and oats at 21% moisture content were placed inside bulk stored oats in a farm granary for 20 wk during summer and autumn in Manitoba to study quality changes. Temp., moisture, O_2 and CO_2 levels, microfloral incidence and abundance, seed germination, free fatty acids, aflatoxins (B_1, B_2, G_1 and G_2), zearalenone, citrinin, penicillic acid, ochratoxin A, sterigmatocystin, and fungal volatiles were monitored during storage. By 4 wk, ochratoxin A had formed at detectable levels in barley and wheat but not in oats; barley contained >5 × more ochratoxin A than did wheat after 20 wk. Strains of *Penicillium verrucosum* var. *cyclopium* were associated with ochratoxin A production. No other mycotoxins were detected. The fungal volatiles increased 10–15 × by 7 wk and declined to control levels by 16 wk. Of the 3 known fungal odours tentatively identified, amounts of 1-octanol were greater than those of 3-methyl-1-butanol and 3-octanone. Of the 3 grains, barley showed the least heating, moisture increase, O_2 decrease, CO_2 increase, fat acidity value increase, and germination loss. AS

61

[Aflatoxin residues in Austrian dried milks.]
Aflatoxinrückstände in Trockenmilch österreichischer Herkunft.

Pfleger, R.; Brandl, E.
Wiener Tierärztliche Monatsschrift 67 (3) 101–106 (1980) [36 ref. De, en] [Vet. Med. Univ. Wien, Linke Bahngasse 11, A-1030 Vienna, Austria]

Aflatoxin M_1 was determined in 1047 samples of dried milk obtained over 12 month from 6 Austrian dried milk plants. Of 210 samples from the winter feeding period, 8 contained >0.2 μg/kg, the limit of detection of the method used [Schuller et al., *Arzneimittel Forschung* (1970) 20, 1517]. Of the other 837 samples, analysed by the BGA method [see FSTA (1976) 8 10P1958], 56% contained >0.03 μg/kg (limit of detection) and 13 samples >0.2 μg/kg. Only 1 of the 1047 samples contained high concn. (0.69 μg/kg). Fewer aflatoxin-positive samples were detected during the summer feeding period. RM

62

[Occurrence of aflatoxin M_1 in dried whey: seasonal contamination.]
Fremy, J. M.; Gaymard, A.
Lait 60 (599/600) 635–644 (1980) [9 ref. Fr, en] [Min. de l'Agric., Lab. Cent. d'Hygiene Alimentaire, 43, Rue de Dantzig, Paris 75015, France]

During the period Nov. 1977–Sept. 1979, 86 samples of dried whey from cheese factories were examined for aflatoxin M_1 (AM_1) by the method of Kiermeier [FSTA (1976) 8 10P1958] which enabled 0.5 μg AM_1/kg to be measured. 25 of the samples contained <0.1 μg/kg, 26 contained <0.5 μg/kg, 13 contained 0.5–0.9 μg/kg, 13 contained 1–1.9 μg/kg and 9 contained >2 μg/kg; only 1 sample contained >5 μg/kg, which is the max. permitted level in dried whey in France. Samples taken in the winter months were more highly contaminated with AM_1 than summer samples. Of 74 samples of dried whey from 61 dairy factories in different regions of France examined in May 1979, 46 contained no detectable AM_1; 13 samples contained >1 μg/kg, the highest level being 2.6 μg/kg. Samples taken from locations in western France had the lowest levels of contamination. MEG

63

Analysis of milk for aflatoxin M_1 – a comparison of thin layer chromatography and high performance liquid chromatography methods. (In *'Proceedings of a third meeting on mycotoxins in animal disease, held at the National College of Food Technology, Weybridge. 17–18 April 1978.'*) [Lecture]
Glancy, E. M.
pp. 28–33 (1979) [6 ref. En] [Cent. Vet. Lab., MAFF, Weybridge, Surrey, UK]

Routine samples of producer/retailer milk obtained from regional and sub-centre microbiologists were analysed for aflatoxin M_1 by 2-dimensional TLC using the method developed by Patterson et al. [*Food and Cosmetics Toxicology* (1978) 16, 49] involving simultaneous protein precipitation and membrane clean-up followed by extraction of the toxin into chloroform. The TLC plates are developed with chloroform/acetone/propan-2-ol (80:15:5) followed by toluene/ethyl acetate/90% formic acid (60:30:10), and viewed under UV light (365 nm). Limit of detection was about 0.03 μg aflatoxin M_1/l milk, and limit of quantification was 0.052 μg/l. Milk extracts were also analysed using high performance liquid chromatography (HPLC) on stainless steel columns packed with Spherisorb S5 ODS (5 μm) and eluted with chloroform (water-saturated)/cyclohexane/acetonitrile/propan-2-ol (150:45:6:4, v/v) or packed with Lichrosorb Si 60 (5 μm) and eluted with either 5% methanol in dichloromethane/chloroform (60:40 vol., 50% water saturated) or chloroform/cyclohexane/acetonitrile/propan-2-ol (150:45:6:8 by vol.). Analysis of 278 milk samples by the 2-dimensional TLC method revealed that 15% had detectable concn. of aflatoxin M_1 (0.052–0.52 μg/l). Considering the min. level of detection of pure aflatoxin M_1 standards (about 25 ng) and interference from other non-specific fluorescing components present in milk extracts, there was little likelihood of measuring the toxin in any of the samples using the best HPLC conditions described. [See also FSTA (1981) 13 6C194.] DMK

64

Toxicology of aflatoxin B_1, warfarin and cadmium in young pigs.

Osuna, O.

Dissertation Abstracts International, B 41 (2) 487: Order no. 80-16567, 266pp. (1980) [En] [Univ. of Florida, Gainesville, Florida 32601, USA]

The objectives of this study were to compare the toxic effects of aflatoxin B_1 and warfarin and to determine whether an additive effect from either of these compounds occurs when Cd is present at higher than normal levels in the diets of young pigs (healthy weaned barrows of mixed breed). The pigs received 5 daily doses of aflatoxin B_1 or warfarin during the fifth wk of the study and the effects (e.g. on body wt., feed consumption, blood composition) were examined for 10 days. Cd (as $CdCl_2$) was provided daily for 40 days via diets containing 83 μg Cd/g. Cd concn. (μg/g) found were 42.9 in kidney, 7.92 in liver and <0.22 in muscle tissues. Results indicated that the presence of Cd in the diet inhibits the toxic effects of aflatoxin B_1 but enhances the toxic effects of warfarin. It is suggested that Cd may block the liver microsomal enzyme system and prevent activation of aflatoxin B_1 as a toxic anticoagulant metabolite; this blocking action prevents inactivation of warfarin and thus enhances its anticoagulant effects. JA

65

[Choice of method for simultaneous determination of aflatoxins B_1 and M_1 in the liver of slaughter animals.]

Bartos, J.; Matyas, Z.

Veterinarni Medicina 25 (8) 495–500 (1980) [14 ref. Cs, ru, en, de] [Vyzkumny Ustav Vet. Lekarstvi, 621 32 Brno, Czechoslovakia]

In continuation of the study of methods for detn. of B_1 and M_1 aflatoxins [See FSTA (1981) 13 1S49], the method of Egmond et al. [Paper presented at the IUPAC symposium on Mycotoxins and Phytotoxins, 29–31 Aug. 1979] was chosen as the most suitable for simultaneous detn. of aflatoxins B_1 and M_1 in livers of slaughter animals. The procedure is described in detail. A total of 88 liver samples (52 of pig, 23 of bull, 6 of cow, and 5 of calf livers, and 2 of livers of pigs dying before slaughter) were examined, and aflatoxins were detected in 8 (9%), mostly in cases of emergency slaughter, including those suspected of aflatoxicosis. Among the normal slaughter animals, aflatoxins were detected in 1 of 36 samples of pig liver and in none of the 29 samples of cattle liver. 5 of 18 samples of pig liver and 2 of 5 samples of cattle liver from emergency slaughter for suspected aflatoxicosis contained aflatoxins, aflatoxin M_1 being present in all, and aflatoxin B_1 being present in 3. Aflatoxin concn. was ≤100 ng/kg. SKK

66

Effect of free fatty acids on aflatoxin production in a synthetic medium.

Priyadarshini, E.; Tulpule, P. G.

Food and Cosmetics Toxicology 18 (4) 367–369 (1980) [13 ref. En] [Nat. Inst. of Nutr., Indian Council of Med. Res., Jamai-Osmania P.O.; Hyderabad-500007, India]

Investigations were undertaken to determine the effects of 4 saturated fatty acids (myristic acid, palmitic acid, stearic acid and lauric acid), 2 unsaturated fatty acids (oleic acid and linoleic acid) and coconut and safflower oil on the in vitro production of aflatoxin B_1 by *Aspergillus parasiticus*. Results showed that myristic, palmitic and stearic acids stimulated aflatoxin B_1, synthesis while oleic and linoleic acid tended to inhibit toxin synthesis. Growth of *A. parasiticus* was greatly inhibited by lauric acid. When 100 mg of coconut oil (90–95% saturated fatty acids) was incorporated in the medium, toxin produced was 410 μg/50 ml medium compared with only 99 μg/50 ml when 100 mg of safflower oil (5% saturated fatty acids and 95% unsaturated fatty acids) was added. The net amount of aflatoxin production in a food grain may therefore be expected to depend on the ratio of saturated to unsaturated fatty acids present. VJG

67

Food toxins. [Review]

Sreenivasamurthy, V.

Journal of Food Science and Technology, India 17 (1/2) 89–94 (1980) [51 ref. En] [Cent. Food Tech. Res. Inst., Mysore-570 013, India]

The review covers natural toxins inherent in foods, e.g. trypsin inhibitor, haemagglutinins, amylase inhibitor, and lathyrogens; and acquired toxins e.g. bacterial toxins (from staphylococci, *Clostridium perfringens* and *Bacillus cereus*) and mycotoxins. The implications of these toxins and their remedial measures are indicated. CFTRI

68

Aflatoxin production on some Egyptian agricultural food commodities.

Mabrouk, S. S.; El-Shayeb, N. M. A.

Chemie Mikrobiologie Technologie der Lebensmittel 6 (6) 167–170 (1980) [23 ref. En, de] [Lab. of Natural Products, Nat. Res. Cent., Dokki, Cairo, Egypt]

2 *Aspergillus flavus* strains (M 93 and No. 182) were grown on various substrates, including grains, legumes, garlic, onion and oil seeds, and aflatoxin formation when incubated for 3, 6, 12, 18, 24 or 30 days at 30°C was examined. Garlic inhibited mould growth. Lentils

supported fungal growth but no aflatoxin was detected. Onion was also a poor substrate for aflatoxin production, especially for *A. flavus* M 93. All other substrates supported fungal growth and aflatoxin formation. Most of the carbohydrate-rich substances supported aflatoxin yields larger than those of the oil seeds when incubated for 3-12 days, but smaller yields when incubated for 18-30 days. Max. aflatoxin yields produced by *A. flavus* M 93 and No. 182 were, resp., (μg aflatoxin/kg substrate) on sesame seeds after 12 days (approx. 18 500) and on sunflower seeds after 18 days (approx. 16 000). RAW

69

Effect of some salts on aflatoxin formation by *Aspergillus flavus.*

Mabrouk, S. S.; El-Shayeb, N. M. A.

Chemie Mikrobiologie Technologie der Lebensmittel 6 (6) 183-185 (1980) [16 ref. En, de] [Lab. of Natural Products, Nat. Res. Cent., Dokki, Cairo, Egypt]

Effect of 14 salts (concn. 0.4-40 000 mg/l) on mycelial growth and aflatoxin formation of a toxigenic strain of *A. flavus* was investigated in rice-corn steep medium. Mycelial wt. were unaffected by the salts except at high concn. of KF, $NaHSO_3$ and NaCl. The salts (i) $ZnSO_4.7H_2O$, (ii) cadmium acetate, (iii) $Ba(NO_3)_2$, (iv) $NaHSO_3$ and (v) KF, were inhibitory at all concn. Min. aflatoxin formation [as % control level] at resp. concn. (mg/l) of the salts was as follows: (i) 48.0 at 100.0, (ii) 17.9 at 50.0, (iii) 56.2 at 50.0, (iv) 20.2 at 40 000 and (v) 26.5 at 4000, [with no growth or aflatoxin formation at 40 000 mg/l]. $FeSO_4$ stimulated aflatoxin production at all concn. (maximum 124.3% at 50.0 mg/l) and $MnCl_2$ was stimulatory at 5.0 and 50.0 but inhibitory at 20.0 mg/l. Additions of $MgSO_4$, $CuSO_4$, $Na_2B_4O_7$, $(NH_4)_6Mo_7O_{24}$, $CaCl_2$, $CoCl_2$ or NaCl were stimulatory at lower concn. and inhibitory at higher concn. for aflatoxin formation. RAW

70

Mycotoxins.

United Nations Environment Programme; World Health Organization

Environmental Health Criteria No. 11, 127pp. (1979) [many ref. En] [Geneva, Switzerland]

This report contains the collective views of an international group of experts on health risks associated with aflatoxins, ochratoxins, zearalenone and trichothecenes; aflatoxins are treated in most detail. Following a summary of the major issues and recommendations for future research, the subjects covered include the chemical properties of aflatoxins, methods for their analysis in foodstuffs, their formation by fungi, occurrence in foodstuffs (maize, wheat etc., groundnuts, soybeans, tree nuts, spices and condiments, dried and liquid milk), fate of aflatoxins during the handling and processing of food, absorption and excretion of aflatoxins in man and animals and their effects, and evaluation of the health risks of exposure to aflatoxins. Properties, methods of analysis, occurrence and health risks of ochratoxin, zearalenone and trichothecenes are also considered. DMK

71

Peanut food products.

Gardner, R. P.

Manufacturing Confectioner 59 (9) 65-67 (1979) [En]

The good manufacturing procedures associated with the production of a wholesome food for human consumption from shelled peanuts are reviewed. Of major importance is the assurance that the level of contamination with aflatoxin is at an acceptably low level, viz. ≤ 25 parts/10^9. In addition to control of the contamination at the time of procurement, roasting and sorting both operate to eliminate a substantial amount of aflatoxin. The efficiency of sorting procedures, both electronic colour sorting and hand sorting from a vibrating table, is assessed, and it is concluded that hand picking is more selective than electronic methods, and also that a high correlation exists between nuts selected on the basis of internal discoloration and their aflatoxin contents. JRR

72

Inhibition of aflatoxin production by carrot root extract.

Batt, C.; Solberg, M.; Ceponis, M.

Journal of Food Science 45 (5) 1210-1213 (1980) [17 ref. En] [Dep. of Food Sci., Rutgers State Univ., Cook Coll., New Brunswick, New Jersey 08903, USA]

The worldwide incidence of aflatoxin contamination of carrot roots is low. This study was conducted to determine the potential of carrot root to support *Aspergillus parasiticus* growth and aflatoxin production. Raw carrot tissue did not support the germination of *A. parasiticus* spores. Autoclaved (121°C, 15 min) carrot tissue supported germination, growth, sporulation, and aflatoxin production by *A. parasiticus*. There was no measureable difference in water activity before or after autoclaving the carrot tissue. There was an increase in water extractable carbohydrate and protein as a result of autoclaving the carrot tissue. Chloroform extracts of carrot tissue contained a compound that inhibited differentiation and aflatoxin production by *A. parasiticus* in both synthetic and semisynthetic media. The inhibitor was optimally active within a pH range 3.5-4.0. The min. inhibitory concn. of the extract at pH 4.5 and at 28°C in minimal salts medium containing 6% glucose and 1.7×10^5 *A. parasiticus* spores was 3.84 g equivalent wt. of tissue/ml assay medium. IFT

73

Aflatoxin in peanuts – a new approach to consumer protection.

Pusey, M.; Oliver, J.

Manufacturing Confectioner 59 (2) 45-47 (1979) [4 ref. En] [Mars Ltd., Dundee Road, Slough, UK]

A semi-mechanized method of analysis for aflatoxins in peanuts is described which enables samples from every tonne of nuts used to be analysed, and increases the accuracy of determinations which is limited at present by sampling errors. The technique is a modification of the AOAC BF method (12th ed.) with changes to some of the reagents, elimination of centrifugation, replacement of some of the apparatus with disposable items, and reduction to a semi-micro scale. The complete process is outlined with reference to a schematic diagram. The method, termed 'Aflamatic' allows 1 analyst to perform up to 100 analyses in 8 h, has a detection limit of 2–3 parts/10^9 aflatoxin B1, and a precision of ±20%. JRR

74

Aflatoxin distribution in individual corn kernels from intact ears.

Lee, L. S.; Lillehoj, E. B.; Kwolek, W. F.
Cereal Chemistry 57 (5) 340–343 (1980) [8 ref. En]
[S. Regional Res. Cent., Sci. & Education Admin., USDA, New Orleans, Louisiana 70119, USA]

3 ears of corn were selected from a lot that showed nominal insect damage and the characteristic greenish yellow spores of *Aspergillus flavus*. Kernels from 4 rows in damaged areas of each ear were observed for mould contamination and BGY fluorescence and then assayed for aflatoxin; 198 individual kernels were assayed. The detection limit of the assay was approx. 100 ng/g. Aflatoxin distribution among kernels was extremely heterogeneous, ranging from 100 to 80 000 ng/g. Kernels containing a high level of aflatoxin were often adjacent to aflatoxin-negative kernels. Some BGY-fluorescent kernels did not contain aflatoxin, but 85% of the kernels with aflatoxin were also BGY-fluorescent. In addition to the kernel-to-kernel variation, ear-to-ear variation was found in toxin levels of corn grown and harvested under identical conditions. AS

75

Mycotoxins in foodstuffs. XIII. Studies on the formation of aflatoxin M_1 in bakery products.

Reiss, J.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 172 (1) 26–29 (1981) [26 ref. En, de]
[Mikrobiol. Lab., Grahamhaus Studt KG, D-6550 Bad Kreuznach, Federal Republic of Germany]

The aflatoxigenic moulds, *Aspergillus flavus* NRRL 3251, *A. parasiticus* CMI 89717 and *A. parasiticus* NRRL 2999 were able to grow on and produce aflatoxins B_1 and G_1 on various types of bread, yet, only the last fungus produced aflatoxin M_1 on these substrates. The highest yields (4 µg/kg) of the aflatoxin M_1 were found on whole wheat bread at a 'Säuregrad' [acid content, measured as NaOH equivalents, ml 0.1N NaOH/10 g sample] of 5–6 and at an incubation temp. of 30°C. Aflatoxin M_1 levels decreased with increasing time of growth; this was probably due to further metabolism of the toxin. *A. flavus* NRRL 3251 and *A. parasiticus* CMI 89717 grew better and produced more aflatoxin M_1 on cake ('Rührkuchen') with a_w 0.92 than on cake with lower water activity. [See FSTA (1979) 11 5M503 for part XII.] AS

76

[Determination and presence of aflatoxin M_1 in bulk milk.]

Maffeo, G.; Gavazzi, L.; Ferrari, G.; Bianchi, L.
Archivio Veterinario Italiano 31 (1/2) 34–37 (1980) [21 ref. It, en]

Aflatoxin M_1 was estimated in 50 samples of bulk milk during Jan.–Sept. 1979, using the AOAC method with slight modifications. 1 sample contained >0.4 µg/l, indicating the need for some control of milk production on farms where forages are contaminated with aflatoxin B_1. BWH

77

Code of practice for control of aflatoxin in groundnut. I. Harvesting, transport and storage of groundnuts.

India, Indian Standards Institution
Indian Standard IS:9071 (Part I)-1979, 9pp. (1979) [En]

Methods are recommended for the harvesting, curing, drying, transport and storage in warehouses or mandis of groundnuts to minimize the development of aflatoxin by growth of the causative moulds. AL

78

Code of practice for control of aflatoxin in groundnut. II. Plant storage and processing flour and oil.

India, Indian Standards Institution
Indian Standard IS:9071 (Part II)-1979, 9pp. (1979) [En]

Methods are recommended for the control of aflatoxin during the buying of groundnuts, their storage and their processing to oilcake or edible flours, and during the treatment of raw groundnut oil prior to edible use. Guidelines are given for selection of groundnut kernels/pods as regards chemical characteristics for food and feed categories. AL

79

High performance liquid chromatographic determination of aflatoxins in animal tissues and products.

Gregory, J. F., III; Manley, D.
Journal of the Association of Official Analytical Chemists 64 (1) 144–151 (1981) [28 ref. En] [Food Sci. & Human Nutr. Dep., Univ. of Florida, Gainesville, Florida 32611, USA]

A method was developed for detn. of aflatoxins M_1, B_1, G_1, B_2, and G_2 in animal tissues, meat, eggs, and dairy products by HPLC. Previous extraction procedures were modified to optimize the precision and recovery of the method. HPLC is performed isocratically with a 5 µm microparticulate octadecylsilica column and fluorometric detection. Analysis is based on treatment of the purified sample extract or standard with trifluoroacetic acid (TFA) to catalyse the hydration of aflatoxins M_1, B_1, and G_1 to the highly fluorescent M_{2a}, B_{2a}, and G_{2a} derivatives. Analysis by HPLC with and without TFA treatment of the extract provides quantitative and qualitative data. Recovery of added aflatoxins and the precision of the recovery depend on the type of sample: mean coeff. of variation for all recovery values was 19.7 ±11.0% for the analysis of liver, ground beef, dairy products [milk, yoghurt] and eggs. The method was sensitive, with a detection limit of 0.05—0.10 ng/g for each aflatoxin. This procedure provides an alternative to existing TLC methods for determining aflatoxins in animal tissues and products. AS

80

The effect of selected agricultural chemicals on growth and secondary metabolism of fungi producing aflatoxin, patulin or citrinin.

Draughon, F. A.

Dissertation Abstracts International, B 40 (6) 2590: Order no. 79-23103, 179pp. (1979) [En] [Univ. of Georgia, Athens, Georgia 30601, USA]

Citrinin production and growth of *Penicillium citrinum* was inhibited by naled, dichlorvos, malathion and diazinon by >75% and by pyrethrum, mevinphos, ethion and allethrin by 740% at 100 mg/l. Naled and its breakdown products inhibited patulin production by *P. urticae* at 10 and 1 mg/l and if applied pre-inoculation at 100 mg/l stopped growth and patulin production for 15 and 30 days, resp. This inhibitory effect was used to protect apples in storage at 25°C. Inhibition by naled is not sp. dependent as it is for Sevin [carbaryl] and pyrethrum. Naled also completely inhibited aflatoxin B_1, B_2, G_1 and G_2 production by *Aspergillus parasiticus* (at 100 mg/l), but at lower concn. dichlorvos proved more effective. Carbamate insecticides inhibited aflatoxin B_1 production at 100 mg/l, B_1 being the most toxic and the most resistant of the aflatoxins, followed by G_1, G_2 and B_2. LH

81

[Garlic and onion extracts and their bactericidal effects.]

Martini, G.

Industrie Alimentari 19 (10) 771-772 (1980) [6 ref. It]

Current data on the inhibitory effects of garlic and onion on bacteria in general and aflatoxins in particular are reviewed. The inhibitory action of garlic on fungi, *Salmonella typhimurium*, *Escherichia coli*, *Staphylococcus aureus*, *Vibrio parahaemolyticus*, *Lactobacillus plantarum*, and *Bacillus aureus* is known. Garlic extracts have been studied to find the optimum concn. to combat *Clostridium perfringens* (1-2% at 40°C, pH 7). Onion has an effect on fungi which produce aflatoxins (*Aspergillus flavus* and *A. parasiticus*, also on *A. niger*, *Penicillium italicum*, *Trytophyton gypseum* and *Microsporon andouini*). Gamma ray treatment does not alter this effect. Most recent research has considered the relationship between such inhibition and the lachrymatory property of onion. Various methods of obtaining onion extracts are also discussed. KME

82

Survey of North Dakota sunflower seeds for aflatoxin.

Casper, H. H.; Backer, L. F.; Kunerth, W.

Journal of the Association of Official Analytical Chemists 64 (1) 228-230 (1981) [9 ref. En] [Dep. of Vet. Sci., North Dakota State Univ., Fargo, N. Dakota 58105, USA]

In a survey of oil-type sunflower seeds, 89 samples were collected from 32 storage bins in 10 counties of N. Dakota in 1979. None of these survey samples exceeded the 20 µg/kg FDA aflatoxin guideline. 4 research samples, from 2 grossly spoiled storages, contained 100-1100 µg/kg aflatoxin B_1. This research is believed to be the first to document natural aflatoxin contamination in sunflower seeds. AS

83

The 'carry over' of aflatoxin M_1 into the milk of cows fed rations containing a low concentration of aflatoxin B_1.

Patterson, D. S. P.; Glancy, E. M.; Roberts, B. A.

Food and Cosmetics Toxicology 18 (1) 35-37 (1980) [11 ref. En] [Cent. Vet. Lab., Weybridge, Surrey KT15 3NB, UK]

Samples of hay, home-grown barley, protein balancer and dairy nuts were analysed for aflatoxin B_1 content. From the values obtained, it was calculated that a ration based on these components contained approx. 10 µg aflatoxin B_1/kg, and that 6 dairy cows fed on this ration ingested 155-244 µg aflatoxin B_1 daily. Bulk milk samples, taken at 7 consecutive morning milkings, contained 0.15-0.26 µg aflatoxin M_1/l (mean value 0.21 µg/l). The aflatoxin M_1 content of milk from individual cows ranged from 0.01 to 0.33 µg/l. Mean daily excretion of aflatoxin M_1 in milk was 4.82 µg for the 6 cows (determined from 1 milking) and 3.27 and 3.48 for 2 cows (determined from 10 consecutive milkings). Expressed as % of ingested aflatoxin B_1, the mean values for daily output of aflatoxin M_1 in milk were 2.64, 1.89 and 2.24% resp. MEG

84

[Sterigmatocystin in cows' milk and the occurrence of aflatoxin in milk products.] Über die Sterigmatocystinausscheidung in Kuhmilch und über das Vorkommen von Aflatoxin in Milchprodukten. [Thesis]

Kraus, P. V.

93pp. (1978) [De] München, Federal Republic of Germany; Tech. Univ.

In 3 laboratory trials, 35 samples of human milk, 46 of infant feeds and 9 of milk products were tested for aflatoxin; results were negative. Sterigmatocystin was carried into milk, though it was detectable only at about 100 ng/100 ml milk (or 30 ng in acetylated form). In field trials with 98 samples of mixed farm milk tested at Weihenstephan Dairy, Federal Republic of Germany 20% of samples contained aflatoxin but only 2 contained sterigmatocystin. A study of the distribution of sterigmatocystin during cheesemaking showed that almost all appeared in the curd (in contrast to aflatoxin M, which divides more or less equally between the curd and whey). [From *Milchwissenschaft* (1979) 34 (7) 430.] RBS

85

[Conditions for formation of ochratoxin A in dry sausages.]

Labie, C.; Tache, S.

Bulletin de l'Academie Veterinaire de France 52 (4) 553–559 (1979) [Fr, en] [Lab. d'Hygiene & Ind. des Denrees Alimentaires d'Origine Anim., Ecole Nat. Vet. de Toulouse, 31076 Toulouse Cedex, France]

Studies were conducted, using a toxigenic strain of *Aspergillus ochraceus*, on the potential for growth and toxin production by toxigenic moulds on dry sausages at various stages of production and ripening. The results show that, for growth and toxin production, it is necessary for the sausage to be contaminated with the mould at a spore count of at least 10^3–10^5/g either before or shortly after filling into the casings, and then held at 22–26°C and 80–86% RH. Mould growth and toxin formation are slow at moisture concn. $<58\%$ in the defatted product; no toxin formation is detectable at moisture contents $<50\%$. *Asp. ochraceus* does not develop on products dried for ≥ 3 wk before inoculation. Formation of up to 120 parts/billion ochratoxin A in the sausages was observed. Ochratoxin concn. decreased gradually during the later stages of ripening; however, appreciable quantities were present after ripening/drying for 60 days. AJDW

86

Improved method for confirmation of identity of aflatoxins B_1 and M_1 in dairy products and animal tissue extracts.

Egmond, H. P. van; Stubblefield, R. D.

Journal of the Association of Official Analytical Chemists 64 (1) 152–155 (1981) [7 ref. En] [Lab. for Chem. Analysis of Foodstuffs, Nat. Inst. of Public Health, PO Box 1, 3720 BA Bilthoven, Netherlands]

A method is described for confirming the identity of aflatoxins B_1 and M_1 in dairy products and liver extracts on a thin layer plate. Extracts and standards containing aflatoxins B_1 and M_1 are spotted on 10 × 10 cm plates, which are developed 2-dimensionally in mixtures of isopropanol/acetone/chloroform. After the first development, trifluoroacetic acid/hexane (1:4) is sprayed on that part of the plate containing the separated extract components and the undeveloped standard spots of B_1 and M_1, and the plate is heated 6–8 min at 75°C. Then the plate is developed in a second direction, and the reaction products of B_1 and M_1 with trifluoroacetic acid from the extract are compared with the same derivatives of the respective standards. The method has been used successfully on extracts of milk, cheese and liver containing B_1 or M_1 at 0.1 ng/g and can be completed in 35–45 min. AS

87

Aflatoxin contamination in grains from the Pacific coast in Guatemala and the effect of storage upon contamination.

Campos, M. de; Crespo Santos, J.; Olszyna-Marzys, A. E.

Bulletin of Environmental Contamination and Toxicology 24 (5) 789–795 (1980) [14 ref. En] [Inst. of Nutr. of Central America & Panama (INCAP), Guatemala]

145 grain samples (corn, coffee, black beans, sorghum, rice, and sesame seeds) were collected from silos, homes and small shops in different villages on the southern coast of Guatemala. 45 samples were fumigated with CS_2 and stored for 6 months during the dry season. 50 duplicate samples of corn, beans and rice were collected within 20 days of harvest in the middle of the rainy season and after 2 months storage. Results are tabulated. 31% of samples stored for 6 months during the dry season were contaminated with aflatoxins, 16% exceeding the 20 parts/billion (p.p.b.) level. Max. value of 37 p.p.b. was found in a coffee sample. In the first set of 50 duplicate samples (collected 20 days after harvest), 16% were found to be positive, 6% exceeded the 20 p.p.b. level with a max. value of 130 p.p.b. Duplicate samples analysed 2 months later showed a high increase in aflatoxin contamination: 24% were contaminated, 16% had values >20 p.p.b. and 12% had values >100 p.p.b. Max. value 1650 p.p.b. was found in corn. None of the 3 rice samples was contaminated. Grains from hot and humid southern coast of Guatemala were very susceptible to aflatoxin contamination, especially during the rainy season. VJG

88

Influence of white light on production of aflatoxins and anthraquinones in *Aspergillus parasiticus*.

Bennett, J. W.; Dunn, J. J.; Goldsman, C. I.

Applied and Environmental Microbiology 41 (2) 488–491 (1981) [16 ref. En] [Dep. of Biol., Tulane Univ., New Orleans, Louisiana 70118, USA]

89

Regulation of aflatoxin biosynthesis: characterization of glucose as an apparent inducer of aflatoxin production.

Abdollahi, A.; Buchanan, R. L.

Journal of Food Science 46 (1) 143–146 (1981) [16 ref. En] [Dep. of Nutr. & Food Sci., Drexel Univ., Philadelphia, Pennsylvania 19104, USA]

Aflatoxins were not produced when *Aspergillus parasiticus* was cultured on medium containing peptone plus mineral salts. Transferring the microorganism to a glucose-containing medium resulted in aflatoxin production. Initiation of aflatoxin synthesis could be blocked by treatment with cycloheximide or actinomycin D. It appears that glucose or a product of its metabolism, acting at the transcriptional level, induces ≥ 1 of the enzymes responsible for aflatoxin synthesis. IFT

90

[Chromatographic determination of aflatoxins in cassava flour.]

Lerario, P.; Bottalico, A.

Annali della Facolta di Agraria, Universita di Bari 30, 669–674 (1978) [14 ref. It, en] [Istituto di Microbiol. Agraria & Tecnica, Univ. di Bari, Bari, Italy]

A procedure for detection of aflatoxins in cassava flour is described, based on extraction of aflatoxins by homogenization with acetone/water (85:15), purification of the extract with $(NH_4)_2SO_4$, re-extraction with benzene, clean-up of the extract by column chromatography on silica gel and alumina, and separation by 2-dimensional TLC on silica gel 60, using diethyl ether/methanol/water (94:4.5:1.5) in the first direction, and chloroform/acetone (88:12) in the second direction. Aflatoxin spots on the chromatogram may be identified by their UV fluorescence after H_2SO_4 treatment. AJDW

91

Effect of caffeine on aflatoxin production on cocoa beans.

Lenovich, L. M.

Journal of Food Science 46 (2) 655, 657 (1981) [13 ref. En] [Hershey Foods Corporate Tech. Cent., Hershey, Pennsylvania 17033, USA]

Effects of caffeine on aflatoxin production by *Aspergillus parasiticus* NRRL 2999 were studied on 13 cocoa bean types. Caffeine levels from bean types ranged from 0.30 to 3.6 mg/g, and only very low levels of aflatoxin were produced on bean types having >1.80 mg caffeine/g. These data provide additional evidence that caffeine is an effective inhibitor of aflatoxin production, and help explain why aflatoxin does not accumulate in cocoa beans under natural storage conditions. IFT

92

Regulation of aflatoxin biosynthesis: induction of aflatoxin production by various carbohydrates.

Abdollahi, A.; Buchanan, R. L.

Journal of Food Science 46 (2) 633–635 (1981) [16 ref. En] [Dep. of Nutr. & Food Sci., Drexel Univ., Philadelphia, Pennsylvania 19104, USA]

Ability of various compounds to induce aflatoxin biosynthesis by *Aspergillus parasiticus* was investigated by initially culturing the organism in a peptone basal medium that does not support aflatoxin production, and then transferring the organism to a replacement medium containing the test compound. Ribose, xylose, glucose, fructose, sorbose, mannose, galactose, maltose, sucrose, raffinose, and glycerol induced aflatoxin production. This induction of alfatoxin production was blocked when cycloheximide was incorporated into the replacement medium. Aflatoxin biosynthesis was not induced by lactose, lactic acid, sodium pyruvate, oleic acid, citric acid, sodium acetate, α-methyl-D-glucoside, 3-*O*-methyl-D-glucoside, cAMP, or cGMP. Results suggest that synthesis of ≥ 1 of the enzymes responsible for aflatoxin formation is regulated by availability of specific readily-metabolizable C sources. IFT

93

A new method of detoxification of cottonseed by means of mixed solvent extraction.

Liu, F.-K.; Jou, S. Y.; Jung, L. Y.

Journal of the American Oil Chemists' Society 58 (2) 93A–94A, 96A (1981) [11 ref. En] [Wushi Light Ind. Inst., Wushi, Kiangsu, China]

Cottonseed expeller prepressed cake was extracted with 90% (by vol.) ethyl alcohol and commercial hexane at 50°C for approx. 90 min. using a small batch extractor and a micella recycle operation. Gossypol, aflatoxin and oil were efficiently extracted; the meal contained 0.32–0.55% total gossypol and $\leq 0.5\%$ residual oil. LH

94

[Contamination of milk with mycotoxins.]

Kontamination der Milch mit Mykotoxinen. [Lecture]

Schultz, G.

Deutsche Tierärztliche Wochenschrift 87 (6) 232–233 (1980) [2 ref. De] [Inst. für Tierernährung der Tierärztlichen Hochschule, Hanover, Federal Republic of Germany]

Of the mycotoxins, aflatoxins are the most dangerous because of the excretion of aflatoxin M_1 in milk of ruminants. Prolonged intake by cattle of 1 mg aflatoxin A/kg feed has a hepatoxic effect; the intake of 2 mg aflatoxin B_1 results in a concn. of 1 μg/kg milk, which is sufficient to increase the risk of liver cancer. Hence the permissible content in cattle feed is 50 μg/kg. [See FSTA (1981) 13 9P1584.] BR

95

Method for the estimation of aflatoxins B_1 and G_1 in animal tissue.

Malik, M. A.; Shah, M. A.; Asghar, M. N.

Pakistan Journal of Science 31 (1/2) 102–106 (1979) [21 ref. En] [Dep. of Physiol. & Biochem., Univ. of Agric., Faisalabad, Pakistan]

The method involves methanol extraction of the sample, purification with chloroform, clean-up using silica gel chromatography, and TLC with isopropanol, acetone and chloroform (3:7:90) as solvents. Average recovery in beef muscle samples spiked with 0.3–0.7 μg aflatoxin B_1 and G_1/kg was 49 and 77% for B_1 and G_1, resp. The method can be applied to other animal tissues, milk and eggs. DMK

96

Use of aflatoxin-producing ability medium to distinguish aflatoxin-producing strains of *Aspergillus flavus*.

Wicklow, D. T.; Shotwell, O. L.; Adams, G. L.

Applied and Environmental Microbiology 41 (3) 697–699 (1981) [4 ref. En] [N. Reg. Res. Cent., USDA, Peoria, Illinois 61604, USA]

Aflatoxin-producing ability medium (APAM) was tested for its ability to distinguish aflatoxin-positive from aflatoxin-negative strains of *Aspergillus flavus* in naturally occurring populations from corn at harvest. All of the aflatoxin-positive strains and some of the aflatoxin-negative strains produced aflatoxins when cultured on cracked corn. Although the data indicate that APAM is not entirely reliable in distinguishing potential aflatoxin-producing strains of *A. flavus* from nontoxigenic strains, it is significant that the medium did not yield false-positives. AS

97

Inhibition of aflatoxin production by selected insecticides.
Draughon, F. A.; Ayres, J. C.
Applied and Environmental Microbiology 41 (4) 972-976 (1981) [22 ref. En] [Dep. of Food Tech. & Sci., Univ. of Tennessee, Knoxville, Tennessee 37901, USA]

At present there is no practical method to eliminate toxigenic fungi from crops. This investigation determined growth and toxin production by *Aspergillus parasiticus* when selected insecticides, i.e. naled (NL), dichlorvos (DC), Landrin (LD), pyrethrum (PY), Sevin (SV), malathion (ML), Diazinon (DZ), methoxychlor and piperonyl butoxide, were introduced into liquid medium, and identified some factors contributing to insecticide inhibition of aflatoxin production. NL at concn. 100 p.p.m. completely inhibited production of aflatoxins B_1, B_2, G_1 and G_2 by and growth of *A. parasiticus*. DC, LD, PY, SV, ML and DZ at concn. 100 p.p.m. significantly ($P = 0.05$) inhibited aflatoxins production, but at 10 p.p.m. inhibition was found only with NL, DC, SV, LD and PY. Growth of *A. parasiticus* was inhibited by 28.9, 18.9, 15.7 and 100% when using 100 p.p.m. of DC, LD, SV and NL, resp. Growth stimulation occurred when DZ was added to cultures. Aflatoxin B_1 was most resistant to inhibition by insecticides, followed by G_1, G_2 and B_2. AL

98

Potential for aflatoxin contamination in peanuts (*Arachis hypogaea* L.) before and soon after harvest - a review. [Review]
Mixon, A. C.
Journal of Environmental Quality 9 (3) 344-349 (1980) [73 ref. En] [Univ. of Georgia Coll of Agric. Exp. Sta., Coastal Plain Sta., Tifton, Georgia 31794, USA]

Certain environmental conditions, microbial and biological activities, and genotypes of the peanut interact to influence the vulnerability of the peanut fruit to invasion by *Aspergillus flavus* Link ex Fr. and to the elaboration of aflatoxin during pod development and in the harvesting and drying period. Management procedures during this time may influence the degree of fungal invasion and aflatoxin contamination. Such procedures include: rotating peanuts with other crops that reduce the soil population of *A. flavus;* using cultural practices that remove plant residues from around peanut plants; preventing drought stress and biological and harvest mechanical damage; harvesting at optimum pod maturity; and continuous safe and rapid drying of peanuts after digging. The potential for using genotypes identified to be resistant to seed colonization by *Aspergillus* species for breeding agronomically suitable cv. with resistance to the aflatoxin-producing fungus was explored. Factors found to be associated with resistance to fungal colonization of the peanut seed testa are cell structure, cell arrangement, permeability, waxy surface, tannin content, and amino acid components. Field application of fungicides have not proven effective in controlling contamination by the fungus. AS

99

[Natural occurrence of aflatoxins in 'An'-beans, and their contents in 'An', (or mushed bean products).]
Saito, K.; Nishijima, M.; Yasuda, K.; Kamimura, H.; Ibe, A.; Nagayama, T.; Ushiyama, H.; Naoi, Y.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] 20 (5) 358-362 (1979) [2 ref. Ja,en] [Tokyo Metropolitan Res. Lab. of Public Health, Hyakunia-cho 3-chome, Shinjuku-ku, Tokyo, Japan]

Aflatoxins were detected in 11 out of 610 samples tested such as butter beans and saltani-saltapya beans. Their contents were 1-27 parts/billion (p.p.b.) of aflatoxin B_1 and 0.4-7 p.p.b. of aflatoxin B_2. For the mushed bean product 'An', their contents were reduced to 13-15% compared to the original levels in the raw beans. TM

100

Mutagenicity of peanut oils and effect of repeated cooking.
Fong, L. Y. Y.; Ton, C. C. T.; Koonanuwatchaidet, P.; Huang, D. P.
Food and Cosmetics Toxicology 18 (5) 467-470 (1980) [16 ref. En] [Dep. of Biochem., Univ. of Hong Kong, Hong Kong]

4 samples of peanut oils obtained from local markets in Hong Kong were tested for mutagenicity using the Salmonella/microsomal test system. In the presence of microsomes, dimethylsulphoxide (DMSO) extracts of all of the samples were mutagenic to *Salmonella typhimurium* strains TA98 and TA100, but the mutagenic activity of the oils decreased after they had been repeatedly cooked. However, when the extracts were pre-incubated with the bacteria (TA100) and microsomes the mutagenic activity of the cooked oils was greater than that of the uncooked oils, suggesting the possible contamination of the cooked oils by N-nitrosamines. Mutagenic activity was also detected in random samples of 7 other brands of uncooked oils obtained from local markets. By absorption spectrophotometry aflatoxin B_1 levels in 3 of these oils were found to range from 98 to 150 μg/kg. DMSO-extracts of 10 samples of poor-grade market peanuts were also mutagenic and the peanut contained 95-1055 μg aflatoxin B_1/kg. The contamination of local peanut oils by mutagens before and after repeated cooking is concerning, since in 90% of Chinese households in Hong Kong peanut oils are used daily for cooking and are habitually saved and re-used repeatedly. AS

101

[Occurrence of aflatoxin M_1 in milk and dried milk in the Federal Republic of Germany.] Untersuchungen zum Vorkommen von Aflatoxin M_1 in Milch und Milchpulver in der Bundesrepublik Deutschland.
Heeschen, W.; Blüthgen, A.; Tolle, A.; Engel, G.
Milchwissenschaft 36 (1) 1-4 (1981) [16 ref. De, en] [Inst. für Hygiene & Mikrobiol., Bundesanstalt für Milchforschung, Kiel, Federal Republic of Germany]

Examination in Nov. 1979-spring 1980, of 381 samples of milk and dried milk from different regions of the Federal Republic of Germany gave average aflatoxin M_1 contents of 8.3, 13.7, 9.1 and 12.4 ng/kg in raw milk, pasteurized milk, UHT milk and dried milk resp. Min. and max. contents of aflatoxin M_1 in pasteurized milk were 0.2 and 67.4 ng/kg resp.   RBS

102

Comparison of radioimmunoassay and enzyme-linked immunosorbent assay for determining aflatoxin M_1 in milk.
Pestka, J. J.; Li, Y.; Harder, W. O.; Chu, F. S.
Journal of the Association of Official Analytical Chemists 64 (2) 294–301 (1981) [36 ref. En] [Dep. of Food Sci., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Using a highly specific antibody against aflatoxin M_1, a radioimmunoassay (RIA) and an enzyme-linked immunosorbent assay (ELISA) were developed for the quantitation of M_1 in milk. RIA was sensitive in the range 5–50 ng/assay but was subject to interference by whole milk. Extraction and cleanup were therefore necessary for the detection of M_1 in milk at 0.5 ng/ml. An ELISA procedure was developed by using an aflatoxin M_1-carboxymethyl-horseradish peroxidase conjugate as the ligand. Competitive assays revealed that this system was relatively more sensitive for M_1 than for B_1, and had a much lower degree of cross-reactivity for aflatoxins B_2, G_1, G_2, B_{2a}, and aflatoxicol. As low as 0.25 ng M_1/ml in artificially contaminated milk (raw, whole, skim) could be detected by ELISA in 3 h without extraction or cleanup. Because of its simplicity, sensitivity, and specificity, ELISA is the preferred method for monitoring aflatoxin M_1 in milk. AS

103

[Effect of feed with low aflatoxin B_1 content on health condition of carp (*Cyprinus carpio*).]
Svobodova, Z.; Piskac, A.
Zivocisna Vyroba 25 (11) 809–814 (1980) [25 ref. Cs, ru, en, de] [Vyzkumny Ustav Rybarsky & Hydrobiol., 389 25 Vodnany, Czechoslovakia]

During July–Oct. 1979, 200 carp (mean wt. 34 g) received in an experimental pond 84 kg barley meal to which 2 μg aflatoxin B_1 had been added/kg; another 200 carp (mean wt. 33 g) in a control pond received the same quantity of barley meal without aflatoxin addition. The experiment lasted 83 days, at the end of which no differences in wt. (360–380 g), condition, health or physiological state were found between the experimental and control carp; no aflatoxin residues were detected in the muscles of either group (≤ 50 fish examined in each group).   SKK

104

[Studies on the degradation of aflatoxins by intestinal microorganisms. II. Degradation of aflatoxin B_1 by microorganisms isolated from the faeces of rat.]
Itoh, Y.; Morishita, Y.; Aibara, K.
Journal of the Agricultural Chemical Society of Japan [Nihon Nogei Kagakkai-shi] 53 (3) 97–102 (1979) [4 ref. Ja, en] [Dep. of Biomedical Res. on Foods, Nat. Inst. of Health, Shinagawa-ku, Tokyo 104, Japan]

105

Survey of aflatoxin-producing fungi in certain fermented foods and beverages in Thailand.
Sripathomswat, N.; Thasnakorn, P.
Mycopathologia 73 (2) 83–88 (1981) [25 ref. En] [Dep. of Microbiol., Siriraj Hospital, Bangkok 7, Thailand]

This paper presents a survey of aflatoxin contamination in certain fermented foods in Thailand. 171 strains of fungi were isolated from the fermented foods and beverages: (i) fermented rice (kaomak), (ii) soybean sauce (taotje), (iii) peanut butter, (iv) soy sauce (shoyu), (v) Thai red and white wine, and (vi) rice sugar wine. The *Aspergillus* spp. were approx. 60% of the total isolates (102 strains). 20 of the strains were *A. flavus* and they were isolated from (ii), (iii) and (iv). The foods were extracted directly and tested for aflatoxins by TLC and HPLC. 4 strains of aflatoxin-producing fungi were isolated from (ii), (iii), and (iv). Direct extracts of 10% of the (iii) tested and 5% of the (i) tested contained large amounts of aflatoxins. HPLC could not detect the amount of aflatoxin G_1 from *A. flavus* 12, *A. terreus* 14, and kaomak 19. According to the TLC method, aflatoxin G_1 was also produced by these strains and was found in kaomak. The amounts of aflatoxin B_1 and G_1 observed in (iii) and (i) were higher than the 30 parts/billion WHO suggested max. permitted level in foods.   VJG

106

[Mycotoxin contamination of foods, with reference to maximum tolerances.]
Pantovic, D.; Adamovic, V. M.
Hrana i Ishrana 21 (7/8) 177–180 (1980) [22 ref. Sh, en] [Zavod za Zastitu Zdravlja SR Srbije, Belgrade, Yugoslavia]

666 samples of imported foods (wheat, corn, barley, oats, beans, rice, coffee, cocoa, dried fruit, almonds, hazelnuts, walnuts, groundnuts, and cashew nuts) collected over 4 yr were examined for aflatoxins (B_1 and G_1), ochratoxin and zearalenone. 26% (173) of samples contained aflatoxins B_1 and G_1, 22.9% containing ≤ 5 parts/billion (p.p.b.), 1.5% containing ≤ 10 p.p.b., and 1.5% containing > 10 p.p.b. 242 of the total samples were cereals; of these, 51.3% were contaminated with aflatoxins B_1 and G_1. Ochratoxin was not detected in any samples; zearalenone was detected only in 50% of the corn samples examined, at concn. of 0.25–2.6 p.p.m. The authors conclude that the current max. permissible concn. of aflatoxin B_1 and G_1 in cereals (of 1 p.p.b.) should be raised to 5 p.p.b.   IN

107

[Mycotoxins in food and their influence on human health.] [Review]
Gertig, H.; Szajkowski, Z.
Zywieni Czlowieka 6 (3) 143–149 (1979) [34 ref. Pl] [Zakladu Bromatologii Inst. Bioanalizy i Badania Srodowiska AM, Poznan, Poland]

In this short review, aspects covered include mycotoxin occurrence; mycotoxin-producing strains; pathogenic effect and the LD_{50} toxicity levels determined in animal trials; optimal synthesis conditions; and methods to prevent or inhibit mycotoxin formation. The most important data on toxicity, origin and effects (with references) are tabulated for 32 mycotoxins.   IN

108

[Studies on the toxigenic mold contamination of foodstuffs. V. Mycoflora of potato starches in Hokkaido.]
Ogasawara, K.; Umemura, M.
Report of the Hokkaido Institute of Public Health [Hokkaidoritsu Eisei Kenkyusho Ho] No. 30, 25-28 (1980) [20 ref. Ja]

Of 71 samples of potato starch manufactured in 17 factories in Hokkaido, 85.9% (61) were contaminated with moulds (0-53 spores/g). In all, 34 spp. were found but the most common were Fungi imperfecti, *Trichocladium* was found in 29.6% of samples, *Coniothyrium* in 21.1% and *Aspergillus glaucus* group in 19.7%. *Aspergillus flavus* group was found in 7.0% (5) but one of the moulds isolated produced aflatoxin. No coliform bacteria were found. 66.7% of samples (47) had <300 ordinary bacteria/g. [From Ja summ.] BWH

109

[Formation of mycotoxins (ochratoxin) and their detoxification in cereal grains.]
Chelkowski, J.
Roczniki Akademii Rolniczej w Poznaniu Rozprawy Naukowe No. 100, 47pp. (1980) [132 ref. Pl, en, ru]

Influence of several factors such as cereal type and var. and native mycoflora on contamination of grain by mycotoxins, and effectiveness of detoxification methods were investigated. Commercial cereals contained up to 10^9 fungal spores/g. *Aspergillus* and *Penicillium* spp. predominated in barley. Of 49 typical fungal isolates, 9 were toxinogenic. Major contamination was by ochratoxin A; citrinin, penicillic acid and sterigmatocystin were also found. Level of contamination varied from yr to yr, but general trend was for 5-7% of samples to be contaminated by mycotoxins 2 months after harvest, with ochratoxin A content up to 140 µg/kg. Growth and ochratoxin A production was lower on sound viable kernels than on unviable grains. Variety had a marked influence on rate of fungal development for several var. of wheat, rye and barley. Wet or dry cleaning and sorting did not significantly reduce mycotoxin content of grain. Uniform distribution of ochratoxin A in bran and flour showed that milling would not produce detoxified flour from a contaminated grain. Ochratoxin content of barley was reduced by pearling. Detoxification of feed grain by treatment with aqueous NH_3 was also studied. [From En summ.] DIH

110

[Measurement of aflatoxin M in milk and milk products.]
Lafont, P.; Siriwardana, M.; Jacquet, J.; Gaillardin, M.; Sarfati, J.
Lait 61 (605/606) 275-281 (1981) [7 ref. Fr, en] [INSERM, Service de Microbiol. Appliquee a l'Alimentation et a la Nutr., 44 Chemin de Ronde, 78110 Le Vesinet, France]

Liquid or fermented milks (50 ml) are heated in boiling water for 5 min and then cooled to room temp. before gradual mixing with 60 ml isopropanol. After shaking vigorously for 1 min, further additions of 50 ml methanol, 10 g celite and 250 ml chloroform are made.

111

The lower layer of solvent is removed, filtered through 10 g anhydrous Na_2SO_4, concentrated and cleaned-up on a column filled with 10 g anhydrous Na_2SO_4, 1 g alumina, 2 g silica and 2 g anhydrous Na_2SO_4. The column is eluted successively with 50 ml toluene, 50 ml chloroform and 100 ml chloroform:acetone (4:1 v/v). The latter eluate, containing aflatoxin M, is concentrated and analysed by TLC on silica gel plates using ethyl ether:epichlorhydrin:methanol:water (90:6:3:1, v/v) as developing solvent. The plates are examined under UV light for the presence of aflatoxin M1. The method can detect aflatoxin M1 at <10 ng/kg liquid milk. For analysis of cheese, a 20 g sample is homogenized in 10 ml water and extracted with the various solvents as for liquid milk, except that the upper (non-aqueous) phase is removed for concentration and analysis. MEG

112

Growth and aflatoxin production by *Aspergillus parasiticus* in the presence of *Lactobacillus casei*.
El-Gendy, S. M.; Marth, E. H.
Journal of Food Protection 44 (3) 211-212, 214 (1981) [14 ref. En] [Dep. of Food Sci., Food Res. Inst., Univ. of Wisconsin-Madison, Madison, Wisconsin 53706, USA]

When a mineral salts-glucose broth was inoculated simultaneously with *Aspergillus parasiticus* and *Lactobacillus casei* and incubated at 28°C for 10 days, larger numbers of *L. casei* survived than when the bacterium was grown alone; growth of *A. parasiticus* initially was more rapid, but total growth during incubation was comparable to that of the mould growing alone; production of aflatoxin was less than when the mould grew alone; and degradation of aflatoxin by the mould was somewhat greater than when the mould grew alone. Growth of *L. casei* for 3 days before adding *A. parasiticus* resulted in better survival of *L. casei* than when it grew alone, but not better than when the 2 organisms were added to broth simultaneously; slower growth of *A. parasiticus* than when it grew alone; production of less aflatoxin than when the mould grew alone or when both organisms were added to broth simultaneously; and no apparent degradation of aflatoxin during the 10-day incubation period. AS

113

Aflatoxins.
Stapleton, H. L.
Bulletin, Association of Operative Millers Mar./June, 3765 (1979) [8 ref. En] [Seaboard Allied Milling Corp., Kansas City, Missouri, USA]

Some basic facts about aflatoxins are summarized under the headings of definition, history, occurrence and favourable conditions, biological effects, detection, control and regulatory tolerances in the USA. JRR

114

Use of sunlight to partially detoxify groundnut (peanut) cake flour and casein contaminated with aflatoxin B_1.
Thimmappaji Shantha; Venkateshaiah Sreenivasa Murthy
Journal of the Association of Official Analytical Chemists 64 (2) 291–293 (1981) [8 ref. En] [Cent. Food Tech. Res. Inst., Mysore-570013, India]

Aflatoxin B_1 was added to preparations of groundnut cake flour, groundnut protein isolate or casein at 0.5 µg toxin/g sample. The preparations were suspended in buffer (pH 5.4 or 7.4) and subjected to sunlight for 6 h; some samples were dialysed in light or shade for 6 h. Sunlight destroyed 23–33% of aflatoxin added to groundnut cake or protein isolate, vs. 83–88% of that added to casein. Dialysis results suggested that although both casein and groundnut proteins bound aflatoxin, that bound to groundnut proteins was in some way protected against the effect of sunlight. DIH

115

[Effect of degree of milling of chrysotile asbestos and cellulose on the adsorptive behaviour of filter sheets towards aflatoxin B_1.] Einfluss des Mahlgrades von Chrysotil-Asbest und Zellstoff auf das Adsorptionsverhalten von Filterschichten gegenüber Aflatoxin B_1.
Postel, W.; Görg, A.
Brauwissenschaft 34 (2) 41–43 (1981) [3 ref. De, en, fr] [Lehrstuhl für Allgemeine Lebensmitteltechnologie, Tech. Univ. München, 8050 Freising-Weihenstephan, Federal Republic of Germany]

Studies were conducted on effects of the degree of milling of cellulose and chrysotile asbestos on their uptake of aflatoxin B_1 from 7.5% alcohol aqueous solutions (adjusted to pH 3.3 with tartaric acid) containing 5 µg aflatoxin B_1/l. Filter sheets were prepared from: (i) celluloses of various types and 3 degrees of milling (12°, 30° or 50° SR); (ii) 40% chrysotile asbestos + 60% cellulose of 3 degrees of milling as above; or (iii) 60% cellulose (12° SR) and 40% chrysotile asbestos (of 3 degrees of milling). Data are given for the quantity of aflatoxin in the filtrate and the quantity adsorbed on the filter sheet (expressed as µg/l and as % of the initial concn. in the model solution). For (i) no effect of degree of milling of cellulose on aflatoxin adsorption was observed. For (ii), aflatoxin adsorption capacity increased with increased degree of milling of cellulose from a coniferous wood sample or cotton linters, but not for a second sample of conifer cellulose or a sample of deciduous wood cellulose. For (iii), aflatoxin adsorption was increased by a second milling of the chrysotile; a third milling gave no additional increase. The greatest aflatoxin adsorption (89%) of all the filter sheets studied was observed for (iii) sheets containing twice-milled chrysotile. AJDW

116

Phytic acid inhibition of aflatoxin production by *Aspergillus parasiticus* Speare.
Demyers, D. P.
Dissertation Abstracts International, B 41 (1) 10–11: Order no. 80-16398, 47pp. (1980) [En] [Univ. of Maryland, College Park, Maryland 20742, USA]

The role of phytic acid in the resistance of soybeans to *A. parasiticus* aflatoxin production was investigated. Phytic acid was added to liquid media at concn. ranging between 0 and 828 mg/100 ml. In non-buffered semi-synthetic media, phytic acid decreased aflatoxin production, mycelial growth and pH; addition of citrate-phosphate buffer resulted in phytic acid having no effect on aflatoxin production or mycelial growth. With citrate buffer, total aflatoxins decreased with increasing levels of phytic acid, mycelial growth was not affected. Zn or Cu depletion from media reduced or stimulated aflatoxin production resp. Use of synthetic media in the same experiments varied response of *A. parasiticus* to phytic acid according to buffer and media used. In citrate buffer, aflatoxin levels decreased with increasing level of phytic acid. Zn addition (20 µg/ml medium) resulted in higher aflatoxin levels. It is concluded that phytic acid and Zn are important factors in soybean resistance to *A. parasiticus* and aflatoxin production, and that in vivo results can be misleading if fungus growth conditions are not maintained. SP

117

Aflatoxin production in copra by *Aspergillus flavus*.
Tuason, M. A.; Madamba, L. S. P.
Philippine Agriculturist 63 (3) 189–196 (1980) [15 ref. En] [Dep. of Chem., Coll. of Arts & Sci., Univ. of the Philippines at Los Banos, College, Laguna, Philippines]

Aflatoxin production in copra by *Aspergillus flavus* Link ex Fries was studied as a function of time, moisture content and temp. Inoculated samples with moisture contents of 12.30%, 11.30%, 7.80% and 6.80% were incubated at 30°C. Samples containing 12.30% moisture had the most abundant fungal growth and the highest aflatoxin content. Although 100% mould infection was observed 2 days after inoculation, max. level of aflatoxin (247 p.p.b.) was not attained until the fourth day. Similarly, inoculated samples with a moisture content of 8.00% were incubated at 20°, 25°, and 30°C. Max. aflatoxin formation (184 p.p.b.) was observed at 30°C. No aflatoxin was obtained from samples incubated at 20°C even though 100% mould infection was attained. UPLB

118

[Toxin formation by mould microflora in barley.]
Chelkowski, J.; Dopierala, G.; Godlewska, G.; Radomyska, W.
Przemysl Fermentacyjny i Owocowo-Warzywny 23 (10) 10–11 (1979) [16 ref. Pl, ru, en, de] [Akademia Rolnicza, Poznan, Poland]

The predominant types of fungal microflora in brewer's barley during storage, and their toxin forming ability, were investigated. Mycotoxins were determined according to AOAC methods. Four mycotoxins were found, produced by *Aspergillus versicolor, A. repens* and *A. melleus.* Conditions for mycotoxin production are: presence of toxin-formers in the material, and suitable medium and environmental conditions. The practical conclusions are that grain should be treated immediately after harvesting and silos should be charged only with as much grain as can be dried to the desired moisture level in a short time. The development of mouldy odour or growth of mycelium on the grain may result in inferior technological properties and occurrence of mycotoxins. STI

COPYRIGHT REGULATIONS

Form of Declaration and Undertaking

To the Editor, International Food Information Service, Lane End House, Shinfield, Reading, RG2 9BB, Berkshire, England.

1. I...

   of...

   Hereby request you to make and supply to me a

   photocopy of the article covered by Abstract No. ....

   Journal name...

   Volume .... Part .... Pages .... Year ....

   which I require for the purposes of research or private study.

2. I have not previously been supplied with a copy of the said article/part of the said work by any librarian.

3. I undertake that if a copy is supplied to me in compliance with the request made above, I will not use it except for the purposes of research or private study.

   Signature .... Date ....

   (Note: This must be the personal signature of the person making the request. A stamped or typewritten signature or the signature of an agent is NOT sufficient.)

4. Send this form and remittance (20p per page for photocopies, min. charge £2.00 per article) to the above address. A deposit or credit system for payment is also in operation. Details are available on request.

Note: Additional forms are available on-request.

Food Annotated Bibliographies (FABs)

	1969-80 Price	1981 Price	1982 12 monthly issues Price
1. Application of Reverse Osmosis to Food Processing	☐ £10.00	☐ £5.50	☐ £9.00
2. New Sources of Food Protein	☐ £18.00	☐ £12.00	☐ £19.00
3. Natural and Synthetic Sweeteners	☐ £11.00	☐ £6.50	☐ £10.50
4. Techniques for Analysis of Flavour Volatiles	☐ £12.00	☐ £7.50	☐ £12.00
5. Microwaves in Food Processing	☐ £9.50	☐ £5.00	☐ £9.00
6. Texture Analysis of Foods	☐ £15.00	☐ £8.00	☐ £13.00
7. Synthetic Dairy Products	☐ £10.00	☐ £5.50	☐ £9.50
8. Acidulants in Food	☐ £10.00	☐ £5.50	☐ £9.00
9. Agglomeration of Powders	☐ £10.00	☐ £5.50	☐ £9.00
10. Aseptic Packaging	☐ £10.00	☐ £6.50	☐ £10.00
11. EEC Regulations	☐ £10.00	☐ £5.50	☐ £9.00
12. Toxicology of Food Additives	☐ £11.00	☐ £6.50	☐ £10.50
13. Deep Fat Frying	☐ £13.00	☐ £7.50	☐ £12.00
14. Viscosity of Foods	☐ £11.00	☐ £6.00	☐ £9.50
15. Taste Panels in Food Science	☐ £12.00	☐ £7.50	☐ £12.00
16. Taints in Food	☐ £10.00	☐ £6.00	☐ £10.00
17. Microbial Toxins in Food	☐ £12.00	☐ £7.50	☐ £12.00
18. Smoked Food Products	☐ £10.00	☐ £5.50	☐ £9.00
19. Disposal of Waste Food Products	☐ £14.50	☐ £8.00	☐ £13.00
20. Use of Glucose in Food Products	☐ £9.50	☐ £5.00	☐ £9.00
21. Emulsifiers in Foods	☐ £11.00	☐ £6.50	☐ £10.50
22. Stabilizers in Foods	☐ £11.00	☐ £6.50	☐ £10.50
23. Staling and Antistaling Additives	☐ £9.50	☐ £5.00	☐ £9.00
24. Catering Industry	☐ £9.50	☐ £6.00	☐ £9.50
25. Antioxidants	☐ £11.00	☐ £6.50	☐ £10.50
26. Nitrosamines	☐ £9.50	☐ £5.00	☐ £9.00
27. Content and Analysis of Mercury in Foods	☐ £10.00	☐ £6.50	☐ £10.50
28. Content and Analysis of Lead in Foods	☐ £10.00	☐ £5.50	☐ £9.00
29. Heatable Packs	☐ £9.50	☐ £5.00	☐ £8.50
30. Sulphur Dioxide in Food Products	☐ £10.00	☐ £5.50	☐ £9.00
31. Lactic Acid Bacteria in Beverages and Food	☐ £12.00	☐ £7.50	☐ £12.00
32. Colorants	☐ £10.00	☐ £5.50	☐ £9.00
33. Browning of Foods	☐ £10.00	☐ £5.50	☐ £9.00
34. Aflatoxins	☐ £10.00	☐ £6.50	☐ £10.50
35. Antibiotic Properties and Residues in Food excluding Nisin	☐ £9.00	☐ £5.00	☐ £8.50
36. Nisin	☐ £9.00	☐ £5.00	☐ £8.50
37. Cadmium in Foods	☐ £9.50	☐ £5.50	☐ £9.00
38. Coffee	☐ £10.00	☐ £6.00	☐ £10.00
39. Sorbic Acid	☐ £10.00	☐ £5.50	☐ £9.00
40. Arsenic in Foods	☐ £9.00	☐ £5.50	☐ £9.00
41. Ascorbic Acid	☐ £9.00	☐ £6.00	☐ £10.00
42. Thickeners and Gelling Agents	☐ £8.50	☐ £5.50	☐ £9.00
43. Pseudomonadaceae and Food Processing	☐ £9.00	☐ £5.00	☐ £8.50
44. Spores in Food	☐ £8.00	☐ £6.00	☐ £9.50
45. Breadmaking	☐ £10.00	☐ £5.50	☐ £9.00
46. Bread Properties	☐ £9.00	☐ £5.00	☐ £8.50
47. Food Science and Technology Books	☐ £15.00	☐ £9.50	☐ £17.00
48. Nitrates and Nitrates in Meat Products	* ☐ £10.00	☐ £6.00	☐ £10.00
49. Eggs and Poultry Meat	☐ £15.00	☐ £8.50	☐ £13.50
50. Mycotoxins in Foods (Excluding Aflatoxins and Microbial Toxins)	* ☐ £8.00	☐ £5.50	☐ £9.00
51. Meat Canning	* ☐ £10.00	☐ £5.50	☐ £10.00

* Only available from 1974.

Prices include postage by surface mail. For airmail rates, please apply to address below.

To order, or obtain further information, mark the item required, add your name and address and send cash, cheque or postal order to :

INTERNATIONAL FOOD INFORMATION SERVICE (IFIS),
LANE END HOUSE,
SHINFIELD, READING. RG2 9BB.
ENGLAND.

Name...

NTERNATIONAL FOOD INFORMATION SERVICE

ifis

FAB 34

AFLATOXINS

SELECTED FROM VOLUME 14
FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

under the direction of:-

Commonwealth Agricultural Bureaux, Farnham Royal, Slough, Gesellschaft fur Information und Dokumentation, Frankfurt am Main; Institute of Food Technologists, Chicago, Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen.

INTRODUCTION

Food Annotated Bibliographies (FABs) are collections of abstracts on specific topics in food science and technology. The topics are chosen by the staff of the International Food Information Service as being of particular interest or importance. The topics normally interest individual workers, who may not require the full information provided in Food Science and Technology Abstracts, from which the abstracts for FABs are taken. The size and the cost of the FABs are controlled as much as possible with the interests of individual workers in mind.

Titles of the FABs now available are given on the back cover of this booklet. For up-to-date lists of FABs or suggestions for new topics please write to the address on the back cover. New subjects are searched for at least the five most recent volumes of Food Science and Technology Abstracts. Thereafter each FAB is updated monthly. Copies of each months abstracts on any topic may be obtained as indicated on the back cover of this publication. At the end of each volume of up-dating, the abstracts are merged and made available as a separate supplement to the original FAB.

Some of the larger FABs have been divided into sections to facilitate use. FAB 47 also has a subject and author index provided.

Copies of all original articles referred to in the abstracts may be bought (or occasionally borrowed) from the International Food Information Service. A form for ordering these is provided at the end of this FAB.

Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journals, patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

EDITOR

1

[High performance liquid chromatography of aflatoxins with fluorescent detection.]
Murata, H.; Fukushima, S.; Kashimoto, T.
***Proceedings of Osaka Prefectural Institute of Public Health, Food Sanitation [Osaka-furitsu Koshu Eisei kenkyusho Kenkyu Hokoku, Shokuhin Eisei Hen]* 10,** 73–75 (1979) [4 ref. Ja]

Aflatoxins were extracted from peanuts using methyl cyanide and chloroform, or from milk using chloroform, and estimated by high performance liquid chromatography using chloroform:benzene:methyl cyanide:ethanol (225:75:10:25) on a LiChrosorb SI 60 column using a Shimadzu RF-500LC detector. The lower limit of detection was 10 µg/kg for aflatoxin B_2 and M_1 and 0.1 µg/kg for G_1 and G_2. No further purification of samples from milk was required prior to estimation of aflatoxin M_1. BWH

2

Influence of temperature cycling on aflatoxin production.
Lin, Y.-C. P.
Dissertation Abstracts International, B 41 (6) 2107: Order no. 8029136, 84pp. (1980) [En] [Univ. of Georgia, Athens, Georgia 30601, USA]

Examination of the relative distribution of aflatoxins (AF) in *Aspergillus parasiticus* NRRL 2999 mycelium and YES medium (2% yeast extract, 20% sucrose) indicated that >50% of AF B_1, >47% of AF G_1, and >50% of total AF (B_1 + G_1) were greater at 33°C than at 25°C. Both constant and cycling temp. governed AF distribution in mycelium and medium. In *Asp. parasiticus*, cultures receiving thermal inputs of 648–792 degree h/day achieved max. AF production approx. 10 days after incubation, while those receiving <648 degree h/day reached max. aflatoxin production after 10 days. Within the first 5 days of incubation, rate of growth and AF biogenesis were proportional to thermal input. The B_1:G_1 ratio increased as temp. increased. Cycling cultures between 33 and 15°C favoured B_1 accumulation while cycling cultures between 25 and 15°C favoured G_1. Cycling between 38 and 25°C increased the B_1 yield. G_1 production was proportional to incubation time at 25°C. Results with YES and SL (synthetic medium with low salt content) media indicated that 34.5°C favoured B_1 accumulation, while 25°C favoured G_1. Total AF production was higher in YES than SL, G_1 formation was significantly inhibited in SL at 34.5°C, and temp. cycling between 34.5 and 25°C or 34.5 and *Asp. parasiticus* 222 and *Asp. flavus* 271 indicated that the relative proportion of B_1 and G_1 remained the same under both constant and cycling temp. conditions. JA

3

[Characteristics of mycoflora of barley and malts.]
Chelkowski, J.; Tobiasz, W.; Karwowska, W.
***Przemysl Fermentacyjny i Owocowo-Warzywny* 24** (12) 6–8 (1980) [6 ref. Pl, ru, en]

Combine-harvested grain is relatively prone to moulding; data from a 3-yr investigation of this behaviour are presented for barley. Moulds identified were *Aspergillus, Cephalosporium, Penicillium, Phycomycetes, Trichothecium, Botrytis, Chlamydomycetes*, and Fungi Imperfecti; ochratoxin A was detected, but no aflatoxin. It is recommended that clean sound grain should contain <5000 spores/g; at levels of 500 000 spores/g amounts of mycotoxins, especially ochratoxin can be appreciable. In 1979 there was a high mycotoxin-producing *Fusarium* activity. More attention should be given to these moulds and to their metabolites. STI

4

Mycotoxins in coffee.
Levi, C.
***Journal of the Association of Official Analytical Chemists* 63** (6) 1282–1285 (1980) [17 ref. En] [General Foods Corp., Tech. Cent., White Plains, New York 10625, USA]

This paper reviews several studies relating to the susceptibility of green coffee beans to contamination by mycotoxins. Aspects covered by the studies include: normal mould flora of coffee beans; mycotoxin production in beans inoculated with *Aspergillus* spp.; effect of coffee roasting on 3 mycotoxins (aflatoxin, ochratoxin, sterigmatocystin); and the presence of these 3 mycotoxins in commercial samples of green coffee. Some previously unpublished studies of the occurrence of these mycotoxins in green coffee are also briefly reported; the results obtained indicated that the frequency of contamination is extremely low and that, when mycotoxins are found, the level of contamination is also low. Because of these findings and the knowledge that 70–80% of any mycotoxin present is destroyed during roasting it is concluded that the probability of finding mycotoxins in coffee beverage is very low. The author therefore recommends that studies of mycotoxins in coffee be discontinued. JA

5

Minicolumn detection methods for aflatoxin in raw peanuts: collaborative study.
Shotwell, O. L.; Holaday, C.
***Journal of the Association of Official Analytical Chemists* 64** (3) 674–677 (1981) [9 ref. En] [USDA, N. Reg. Res. Cent., Sci. & Education Admin., Peoria, Illinois 61604, USA]

The Holaday-Velasco method [in *Official Methods of Analysis*, AOAC, 13th Ed., sections 26.021–26.025] and a modified Holaday method have been compared. The former method has been approved by the AOAC and the AACC for determining aflatoxin in corn. The Holaday method was modified by substituting toluene for benzene in the solvent partition, and methylene chloride for chloroform in the minicolumn development to eliminate use of hazardous solvents. The neutral alumina in the Holaday minicolumn was changed from activity V to activity III to provide a more stable column. At aflatoxin levels in raw peanuts of 13–20 ng/g, the presence of aflatoxin was missed by the modified Holaday method in 4 analyses (3 laboratories) of 42 reported. There were no misses in this contamination range by the Holaday-Velasco method. There were no misses by either method with samples containing >20 ng total aflatoxins/g. Analysis of uncontaminated raw peanuts by the modified Holaday method resulted in 2 false positives of 14 reports; the Holaday-Velasco method produced no false positive [illegible] from 15 analyses of uncontaminated peanuts.

6

Seed mycoflora, its role in grain spoilage and production of mycotoxins.
Chenulu, V. V.; Dharam Vir
Bulletin of Grain Technology **17 (2)** 148–157 (1979) [56 ref. En] [Div. of Mycology & Plant Path., Indian Agric. Res. Inst., New Delhi-110 012, India]

Aspects discussed include role of fungi; storage fungi, factors affecting spoilage of grains; seed mycoflora and nature of loss; and mycotoxins and other harmful effects of storage fungi and their control. CFTRI

7

A fluorometric iodine rapid screen method for aflatoxin in corn.
Davis, N. D.; Diener, U. L.
Journal of Applied Biochemistry **1 (2)** 123–126 (1979) [4 ref. En] [Dep. of Botany & Microbiol., Auburn Univ. Agric. Exp. Sta., Auburn, Alabama 36830, USA]

Corn was screened for aflatoxin using a new procedure designated the fluorometric iodine rapid screen (FL-IRS) method. Aqueous methanol extracts of samples under test and aflatoxin-free controls were treated with iodine solution and compared for fluorescence intensity. All samples that fluoresced greater than the controls were labelled aflatoxin positive, whereas those that fluoresced less than the controls were labelled aflatoxin negative. 170 sampl of corn were screened by the FL-IRS method and the results compared with those of the bright greenish-yellow fluorescence (BGYF) test. Subsequently, aflatoxin was determined by quantitative analysis. Only one sample containing >20 µg/kg aflatoxin passed through the FL-IRS compared with 4 that passed through the BGYF screen. Moreover, the BGYF screen falsely indicated 47 samples as being contaminated compared with only 14 false positives with the FL-IRS. The speed, accuracy, and economy of the FL-IRS method are sufficient to warrant its use for large-scale screening of corn for aflatoxin. AS

8

Long-term effects of feeding aflatoxin-contaminated market peanut oil to Sprague-Dawley rats.
Fong, L. Y. Y.; Chan, W. C.
Food and Cosmetics Toxicology **19 (2)** 179–183 (1981) [12 ref. En] [Dep. of Biochem., Univ. of Hong Kong, Hong Kong]

Investigations were carried out to determine whether prolonged ingestion, by Sprague-Dawley rats, of aflatoxin-contaminated market peanut oil (aflatoxin B_1 110 µg/kg), consumed as a fat component of the daily diet for 22 months from weaning, would constitute a hazard. Controls were fed aflatoxin free corn oil. The difference between liver-to-body wt. ratios for experimental and control rats (2.93 ± 0.46 and 2.62 ± 0.58, resp.) was statistically significant, reflecting the degree of fatty change in livers of experimental rats compared with that of controls. Unless the susceptibility of human liver to this carcinogen is very different from that of the rat, the data suggest a definite hazard in the ingestion of peanut oils contaminated with 100 parts/billion aflatoxin B_1. Over 90% of Hong Kong households use peanut oils for cooking purposes, thus showing the extent of the possible health hazard. VJG

9

[Contamination of cows' milk by ingestion of low amounts of aflatoxin.]
Lafont, P.; Lafont, J.; Mousset, S.; Frayssinet, C.
Annales de la Nutrition et de l'Alimentation **34 (4)** 699–707 (1980) [14 ref. Fr, en] [INSERM, 44 Chemin de Ronde, 78110 Le Vesinet, BP 40, France]

16 cows in the early and late lactation periods were fed a ration of groundnut meal naturally contaminated by aflatoxin for 8 consecutive days at 0.09, 0.18, 0.86 and 2.58 mg aflatoxin B_1/day. Analysis of the milk showed that the aflatoxin M_1 content was not affected by the vol. of milk secreted/day. The quantity of this hydroxy-derivative expressed as a % of the parent toxin varied from 0.14 to 0.34 in the animals in late lactation and from 0.66 to 0.95 in cows producing approx. 20 l milk/day (early lactation period). In order to achieve a tolerance limit of 20 ng aflatoxin M_1/kg milk, the daily ingestion of aflatoxin B_1 should not exceed 90–100 µg. RM

10

[Aflatoxins in milk and milk products.]
Karim, G.
Journal of Veterinary Faculty, University of Tehran 35 (3/4) 1–10 (1980) [23 ref. Persian, en] [Dep. of Food Hygiene, Univ. of Tehran, Tehran, Iran]

Contamination of milk and dairy products with aflatoxins produced by *Aspergillus flavus* and *Aspergillus parasiticus* is reviewed. Different ways in which contamination occurs and the procedure to reduce the toxin level in dairy products are discussed. Since aflatoxins are hazardous to man, it is suggested that the food and feed consumption in Iran should be controlled. AS

11

[Residues in milk.] Situation und Bewertung von Rückständen in der Milch. [Lecture]
Heeschen, W.; Blüthgen, A.; Tolle, A.
Landwirtschaftliche Forschung, Sonderheft No. 36, 33–40 (1980) [4 ref. De] [Inst. für Hygiene der Bundesanstalt für Milchforschung, Hermann-Weigmann-Str. 1/27, D-2300 Kiel, Federal Republic of Germany]

Since the establishment in 1973 of a legal max. concn. for chlorinated pesticides in animal products, the amount of residues in milk produced in the Federal Republic of Germany has descreased and in 1978 average concn. was $<10\%$ of the max. permitted concn. for all the pesticides monitored except for α- and β-HCH (30%) and lindane (20%). It was estimated that average intake of pesticides from milk (as a % of Acceptable Daily Intake) was for lindane 0.16%, heptachlor epoxide 0.45%, dieldrin 1.3%, DDT 0.26% and hexachlorobenzene 1.9%. The main problem of excessive residues in milk has come from α- and β-HCH which are constituents of products for the control of ectoparasites. In general the amount of heavy metals in milk is slight and the same applies to antibiotics and mycotoxins. Since the introduction of the brilliant black reduction test, the proportion of samples containing antibiotics has decreased to 2–4% of the total; the detected concn. of aflatoxin M in milk is 3–8 ng/kg. [See FSTA (1982) 14 1A23.] RWH

12

[Rapid determination of aflatoxin M$_1$ in milk products.]
Blanc, M.
Industries Alimentaires et Agricoles 97 (9) 893–901 (1980) [24 ref. Fr] [Lab. Wolff, 198 Rue Sigmond Freud, 75019 Paris, France]

A fast, accurate, sensitive and specific method was developed for estimation of aflatoxin M$_1$ in milk products. The metabolite of aflatoxin B$_1$ is found in cows' milk after ingestion of contaminated feed. The method involves extraction by a ternary mixture of methanol/chloroform/water [FSTA (1971) 3 10C191], purification by silica gel column chromatography, and HPLC estimation with fluorimetric detection in a silica cell [FSTA (1980) 12 8C346] at wavelengths 365 nm (excitation) and 431 nm (emission). Tabulated results showed recoveries of 85–98% from liquid and dried milk, yoghurt and Gruyere cheese contaminated with M$_1$ at 5 µg/kg, vs. 65–88% by Stubblefield's and Kiermeyer's methods [FSTA (1979) 11 10N462 and (1977) 9 1S96]. RM

13

[Variations in levels of aflatoxin B$_1$ in foods and animal feeds during the period 1971–1979.]
Sabino, M.
Revista do Instituto Adolfo Lutz 40 (2) 153–158 (1980) [4 ref. Pt, en] [Secao de Quimica Biol. do Inst. Adolfo Lutz, Sao Paulo, Brazil]

Samples of several foods (groundnuts and groundnut products, soy meal, corn, wheat, oats, cassava, rice, prepared foods) and animal feeds sold in Sao Paulo State and other areas of Brazil were examined by TLC for aflatoxin B$_1$ content. Results (tabulated) showed ranges of 0–7800 µg/kg. Mean annual % above the max. concn. of 30 µg/kg permitted by Brazilian legislation were 13.6 in 1976/1977, declining gradually to 10.0 in 1979. HBr

14

[Hazardous aflatoxins.] Gefährliche Aflatoxine.
Wilke, R.
Zeitschrift für Lebensmittel-Technologie und -Verfahrenstechnik 30 (2) 69–70 (1979) [6 ref. De]

Aflatoxins are briefly discussed with reference to: formation of aflatoxins by *Aspergillus flavus;* foods in which aflatoxins occur; toxicity and carcinogenicity of aflatoxins; legislation for aflatoxins in foods in the Federal Republic of Germany; and problems with sampling of foods for aflatoxin analyses. AJDW

15

Infant formulas as substrates for aflatoxin production.
Bennett, J. W.; Dunn, J. J.; Goldberg, E. J.
Developments in Industrial Microbiology 21, 379–383 (1980) [16 ref. En] [Tulane Univ., New Orleans, Louisiana 70118, USA]

4 brands of hypoallergenic infant formulas were compared with a milk-based formula and cows' milk as substrates for aflatoxin production. The infant foods were inoculated with toxigenic *Aspergillus parasiticus* and incubated for 24 h. Both B and G aflatoxins were produced on the hypoallergenic formulas, total aflatoxin contents being 769–4556 ng/ml. On the milk-based formula, only flatoxin B was produced, at 273 ng/ml. Homogenized cows' milk gave the lowest total aflatoxin production (200 ng/ml). The use of artificial infant formulas in developing countries, where adequate sanitation and refrigeration is lacking, has been associated with increased infant mortality. This study suggests the potential for paediatric aflatoxicosis. AS

16

Preparation and characterization of aflatoxin Q$_1$-hemisuccinate.
Lau, H. P.; Fan, S. L.; Chu, F. S.
Journal of the Association of Official Analytical Chemists 64 (3) 681–683 (1981) [13 ref. En] [Food Res. Inst., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

As a first step in production of specific antibodies to aflatoxin Q$_1$, a metabolite of aflatoxin B$_1$, a method was developed for introduction of a reactive functional group into aflatoxin Q$_1$ so that it can be coupled to a carrier protein as an antigen. Aflatoxin Q$_1$ hemiscuccinate is prepared from aflatoxin Q$_1$ in 80–85% yield by acylation with succinic anhydride using 4-*N,N*-dimethylaminopyridine as catalyst. Purification and characterization of the hemisuccinate are described. DIH

17

[Trends in mycotoxin research.] Trends in der Mykotoxinforschung. [Review]
Koch, H. A.; Kneist, S.; Rademacher, K.-H.
Lebensmittelindustrie 27 (10) 451–454 (1980) [36 ref. De, en, ru, fr] [Mykologische Abteilung, Hautklinik der Med. Akad., Erfurt, German Democratic Republic]

In this review, the occurrence of mycotoxins as a direct result of mould contamination in foods and feedstuffs is discussed, as well as their effects. Data are tabulated on important mycotoxins, their producers and effects, LD$_{50}$, formation of derived compounds, and their chemical/physical properties (including formulae, mol. wt., and melting point). Mycotoxin contamination of foods, e.g. fruit, fruit juices, cereals, and nuts, and of feedstuffs (fodder corn, straw) are discussed in depth. Mycotoxin transfer from acutely toxic feedstuffs into food products must also be considered, e.g. into cows milk, hens' eggs, muscle and fat tissue, and liver and kidneys of pigs and cows. Methods currently used for identification and quantitative detn. of mycotoxins are also discussed, with reference to their suitability and detn. limits; TLC is an important screening test method. IN

18

Aflatoxins: production of the toxins on rice-corn steep medium according to some cultural conditions.

Mabrouk, S. S.; El-Shayeb, N. M. A.

Zentralblatt für Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, II 136 (4) 330–340 (1981) [24 ref. En, de] [Lab. of Natural Products, Nat. Res. Cent., Dokki, Cairo, Egypt]

Rice powder-corn steep (RC) medium proved the most suitable of 6 nutrient liquid media for both aflatoxin formation and mycelial growth by *Aspergillus flavus* strain No. 182, isolated locally. Production of aflatoxins by the mould was studied in relation to some cultural conditions on RC medium. Highest aflatoxin yields (2527 µg/50 ml) by *A. flavus* were attained using rice (5%, w/v) + corn steep (4%, w/v), at initial pH level of 4, 25°C and 6 days incubation. Initial pH levels at either extreme of the range used (3 and 11), and temp. of incubation below 20°C or above 40°C were inhibitory to mould growth and aflatoxin formation. Ratio of aflatoxin B_1 to G_1 varied with different cultural conditions. Aflatoxin content of the mycelia highly exceeded that of the culture filtrates. AS

19

Effect of boiling, frying, and baking on recovery of aflatoxin from naturally contaminated corn grits or cornmeal.

Stoloff, L.; Trucksess, M. W.

Journal of the Association of Official Analytical Chemists 64 (3) 678–680 (1981) [8 ref. En] [FDA, Div. of Chem. & Physics, Washington, DC 20204, USA]

Corn grits naturally contaminated with aflatoxins were used for making boiled grits, and portions of the boiled grits were used for making pan-fried grits; cornmeal naturally contaminated with aflatoxins was used for making corn muffins. Procedures and recipes were derived from cookbook and market package recommendations. From analyses of the products for aflatoxins before and after preparation of the table-ready products, it was determined that 72 ± 9% ($n = 15$) of the aflatoxin found in the original grits could be recovered after the grits were boiled. The recovery of aflatoxin B_1 after the grits were fried was either 66 ± 10% ($n = 6$) or 47 ± 8% ($n = 9$), depending on whether 3 cups of water or 4 cups of water/cup of grits, resp., were used for preparing the boiled grits before frying. Similarly, it was determined that 87 ± 4% ($n = 9$) of the aflatoxin B_1 found in the original cornmeal could be recovered from the baked muffins. No detectable aflatoxin B_{2a} was present in the extracts from any of the table-ready products. AS

20

Aflatoxin production in khoa.

Lembhe, A. F.; Ranganathan, B.; Ramana Rao, M. V.; Krishna Rao, L.

Journal of Food Protection 44 (2) 137–138, 143 (1981) [10 ref.. En] [Div. of Dairy Bacteriology, Nat. Dairy Res. Inst., Karnal-132 001 (Haryana), India]

Blocks of freshly-made khoa were surface inoculated with *Aspergillus parasiticus* or *A. flavus* spores and incubated at 5°, 28° and 37°C for up to 2 wk. No aflatoxin was detected in samples incubated at 5°C. Approx. equal amounts of aflatoxins B_1 and G_1 were produced at 28 and 37°C. The amounts of aflatoxins B_1 + G_1 detected after 14 days at 28°C were higher than at 37°C, and in the top four 1-cm layers resp. were as follows: with *A. parasiticus* 91.9, 20.8, 2.9 and 0.96 mg/kg sample vs. 11.0, 6.2, 2.5 and 0.24 mg/kg. resp. at 37°C; and with *A. flavus* 81.0, 10.8, 2.52 and 0.28 mg/kg vs. 7.0, 3.5, 1.1 and 0.1 mg/kg, resp. at 37°C. No aflatoxin was detected in the fifth 1-cm layer at either incubation temp. CDP

21

[Natural occurrence of aflatoxins in commercial cheese.]

Saito, K.; Nishijima, M.; Yasuda, K.; Kamimura, H.; Ibe, A.; Nagayama, T.; Ushiyama, H.; Naoi, Y.

Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] 21 (6) 472–475 (1980) [6 ref. Ja, en] [Tokyo Metropolitan Res. Lab. of Public Health, Hyakunin-cho 3-chome, Shinjuku-ku, Tokyo, Japan]

Aflatoxin M_1 was detected in 9 samples of Emmental, Maribo, Cheddar, Gouda, Comte and Mozzarella cheeses in the range of 0.4–1.1 µg/kg. Cheddar and Emmental cheeses, which contained M_1 at 0.4 and 1.1 µg/kg resp., were investigated for 16 months. No difference was found between the concn. of aflatoxin M_1 in 3 different parts of one 250-g package of Emmental, nor between different batches of cheese made on the same date. Contamination of Emmental cheese occurred mainly in cheese made in the winter, but for Cheddar the occurrence was more uniform throughout the year. TM

22

Determination of aflatoxins in animal tissues.

Stubblefield, R. D.; Shotwell, O. L.

Journal of the Association of Official Analytical Chemists 64 (4) 964–968 (1981) [13 ref. En] [USDA, Sci. & Education Administration, N. Reg. Res. Cent., Peoria, Illinois 61604, USA]

A method for detn. of aflatoxins in animal tissues was developed, and applied successfully to beef, swine, chicken, and human livers, and to beef kidney, heart, spleen, muscle, and blood. Blended tissue was denatured with citric acid and extracted with dichloromethane on a wrist-action shaker. After filtration, the extract was partially purified on a silica gel column, and aflatoxins B_1 and M_1 were determined by 2-dimensional TLC and densitometry. Recoveries of B_1 and M_1 added to meat tissues and blood were approx. 90 and 80%, resp. The method gave results for a contaminated freeze-dried liver comparable to analyses by 3 other published meat tissue methods. The method is rapid and has a detn. limit ≤ 0.5 ng/g. In addition, the method uses less toxic and smaller quantities of solvents and chemicals. AS

23

Effects of cooking and/or processing upon levels of aflatoxins in meat from pigs fed a contaminated diet.

Furtado, R. M.; Pearson, A. M.; Gray, J. I.; Hogberg, M. G.; Miller, E. R.

Journal of Food Science 46 (5) 1306–1308, 1319 (1981) [En] [Dep. of Food Sci. & Human Nutr., Michigan State

Univ., E. Lansing, Michigan 48824, USA]

Pork loins, bellies and hams from pigs fed a diet containing 571 and 386 µg of aflatoxins B_1 and B_2/kg feed, resp., for 42 days were analysed for aflatoxins in the fresh, fresh-cooked, cured smoked (hams only) and cured-smoked-cooked states. Although some destruction of aflatoxins B_1 and B_2 occurred during cooking and/or processing, the max. amount of inactivation was $\leq 41\%$ of the total, and was generally in the range of 15–30%. Thus, results suggest that aflatoxins are quite stable during cooking and/or processing. IFT

24

[Determination of aflatoxin in caraway seed.] Aflatoxinbestimmungen in Kümmel.
Hoffmann, B. R.
Fleischwirtschaft **61** (7) 1034–1036, 1039–1042 (1981) [26 ref. De, en] [Sömmerringstrasse 31, D-6500 Mainz 1, Federal Republic of Germany]

Problems with detection of aflatoxins in spices are discussed, with reference to interference by constituents having an aflatoxin-like structure. Caraway seeds, which contain interfering coumarins, were used in comparative studies on published 1- and 2-dimensional TLC procedures; numerous extraction and clean-up methods, solvent systems and detection reagents were studied. Tables of results are given. The relative merits of the various methods are discussed; overall, a modification of the method of Suzuki et al. [*Journal of Food Science* (1973) **38**, 949–950] is recommended. A detailed description is given of the modified technique. AJDW

25

[Experience in analysis of feeds and oilseeds for aflatoxin.] Erfahrungen bei der Untersuchung von Futtermitteln und einigen Ölsaaten auf Aflatoxin.
Bassler, R.
Qualitas Plantarum - Plant Foods for Human Nutrition **30** (3/4) 271–282 (1980) [5 ref. De, en] [Inst. für Angewandte Bot., Marseillerstrasse 7, D-2000 Hamburg 36, Federal Republic of Germany]

This paper includes tables of data for aflatoxin concn. in samples of various oilseeds and nuts. Results include the following (number of aflatoxin-positive samples and number exceeding the appropriate tolerance, with number of samples studied in parentheses:) apricot kernels (7) 2 and 1; hazelnuts (131) 6 and 0; desiccated coconut (9) 0 and 0; pumpkin seed (3) 3 and 2; almonds (43) 9 and 3; poppy seed (3) 0 and 0; and sesame seed (26) 1 and 0. The highest recorded aflatoxin concn. was 700 parts/billion aflatoxin B_1 in almonds. AJDW

26

[Mycotoxins in foods: occurrence and determination.] Mycotoxine in Lebensmitteln – Vorkommen und Bestimmung. [Review]
Weber, R.
Lebensmittelchemie und Gerichtliche Chemie **35** (4) 71–76 (1981) [36 ref. De] [Bundesgesundheitsamt, Max-von-Pettenkofer-Inst., Postfach 33 00 13, 1000 Berlin 33]

Aspects considered in this review include: methods for analysis of aflatoxins in foods, and their advantages and limitations; aflatoxin concn. in various foods; occurrence of patulin in apple products and other foods, and its HPLC, TLC and GLC analysis; ochratoxin A in foods; and methods for simultaneous detn. of a range of mycotoxins. AJDW

27

[Up to date facts on mycotoxins.]
Akrida-Demertze, K.; Demertze, P.; Boudoure, E.
Hemika Hronika **46** (1) 32–39 (1981) [32 ref. Gr, en] [Chair of Food Chem., Univ. of Ioannina, Greece]

Recent knowledge on the old problem of health hazards caused to man and animals by consuming food infected by several species of moulds is reviewed. The upper acceptable levels of mycotoxins in food are given and analytical methods available for detn. of mycotoxins are outlined. Finally, methods of facing the mycotoxin problem are proposed. AS

28

Evaluation of laboratory performance with aflatoxin methods by means of the AOCS Smalley check sample program.
McKinney, J. D.
Journal of the Association of Official Analytical Chemists **64** (4) 939–949 (1981) [4 ref. En] [Ranchers Cotton Oil, PO Box 2596, Fresno, California 93745, USA]

The American Oil Chemists' Society Smalley check sample program offers ongoing check sample series for determination of aflatoxins in peanut meal, cottonseed meal, and corn meal. Laboratories participating in this programme represent a worldwide cross section of industry, regulatory, and commercial laboratories. Each annual series presently consists of 7 samples including a solution of an unknown mixture of aflatoxins B_1, B_2, G_1, and G_2 for direct spotting and quantitation. Participant analyses of the solution of aflatoxins resulted in coeff. of variation generally higher than those of any sample. Comparison of 4 yr of results for analysts using BF and CB methods of analysis for peanut meal samples with aflatoxin B_1 levels ranging from 2 to 56 ng/g resulted in higher aflatoxin B_1 results for the CB method. The number of participants reporting results by HPLC methods is small; however, their results compare closely with those using TLC methods. AS

29

[Separation and semi-quantitative determination of aflatoxins in some cereal and oilseed products.]
Kostyukovskii, Ya. L.; Melamed, D. B.; Tutel'yan, V. A.
Voprosy Pitaniya No. 1, 66–68 (1981) [12 ref. Ru] [Inst. Pitaniya AMN SSR, Moscow, USSR]

A brief discussion of suitable isolation and clean-up methods, optimal conditions for chromatographic separation, methods of analysis and confirmation of aflatoxin in foods is presented, and a modified UV fluorescence method is described for detn. of aflatoxins B_1, B_2, G_1 and G_2 in grains and oilseeds. In wheat, rye, corn and groundnuts, average extraction levels were 71, 69, 74 and 66%, resp. for B_1, and 78, 75, 80 and 70% resp. for G_1 (data tabulated). The method has good accuracy, with sensitivity of about 3 µg/kg product, and a min. detection of 0.2–0.8 ng/spot. Aflatoxin concn. were semi-quantitated by visual comparison of UV-fluorescence intensity at 365 nm of test and 2–3 standard samples; relative s.d. was generally <0.35. The method is recommended for serial analysis of the foods stated. RAW

30

Sampling diced almonds for aflatoxin.
Schade, J. E.; King, A. D., Jr.; Mackey, B. E.; Halbrook, W. U.; Fuller, G.
Journal of the American Oil Chemists' Society **58** (9) 852–857 (1981) [17 ref. En] [W. Reg. Res. Cent., USDA, Berkeley, California 94710, USA]

To ensure that diced almonds meet the current FDA guideline limit for total aflatoxin, it is necessary to have a sampling plant that will allow representative sampling with defined precision, i.e., with confidence limits on the average aflatoxin found. A sequential sampling plan using 4.54-kg samples of diced almonds or 150-g samples of meal by-product (fines screened from diced nuts during production) was constructed with data from a study of aflatoxin distribution among samples of 2 selected lots of almonds. These 2 lots of whole nuts, estimated to have 400 and 25 parts/billion aflatoxin, were diced and boxed with normal processing equipment and procedures to approximate the distribution of aflatoxin in the product during commercial production. With a square root transformation of the data from 4.54-kg samples of diced nuts, the aflatoxin in samples of both lots approximated a normal distribution and the within-lot variances were not significantly different, which allowed the statistical plan described. A supplemental study was made of aflatoxin distribution in the meal by-product. The lack of a significant difference between the results for diced nuts and those for the corresponding meal suggests that diced almonds can be monitored for aflatoxin indirectly by sampling the meal, which will allow the use of fewer analyses of 150-g samples of less expensive product to reach a decision. AS

31

Mycotoxins in stored rice.
Gangopadhyay, S.; Chakrabarti, N. K.
Current Science **50** (6) 272–275 (1981) [13 ref. En] [Cent. Rice Res. Inst., Cuttack-753 006, India]

8 month old (i) raw (ii) single and (iii) double parboiled rice collected from different villages in Orissa state were evaluated for mycotoxins. Results showed that the moisture of (iii) was 20.5 to 22.5% compared to 13.5 to 19.5% in (ii) and 12.3 to 17.5% in (i). *Aspergillus flavus* and *Fusarium moniliforme* contaminated 22.4–29.2 and 23.8–32.5% in (iii), 17.9–24.5% and 22.5–30.8% in (ii) and 12.9–19.5 and 19.8–30.5% in (i) resp. Aflatoxin B_1 from rice infected with *A. flavus* was identified spectrophotometrically and by TLC. Toxin extracted from rice infected with *F. moniliforme* yielded yellow crystals with scanning spectrophotometric peaks between 227 nm and 323 nm, the absorption wave numbers being 47260 and 58358, max. fluorescence emission 450 nm and Rf value on silica gel 0.68. This unidentified toxin seemed to be very close to zearalenone. Toxicity of the above toxins was also evaluated using rabbits. CFTRI

32

[Contamination of milk and dairy products by aflatoxin M_1 in France.]
Blanc, M.; Karleskind, A.
Lait **61** (608) 481–493 (1981) [13 ref. Fr, en] [Lab. Wolff, 198 rue Sigmund-Freud, 75019 Paris, France]

Over a 10 month period (from 1 Sept. 1980 to 30 June 1981), 1046 samples of milk and dairy products from different regions of France were analysed for aflatoxin M_1 content. Full details of the method of analysis are given. $>40\%$ of the samples contained >50 ng aflatoxin M_1/kg. Mean contents of aflatoxin M_1 in 380 samples of liquid milk, 222 of dried milk, 199 of fresh cheese, 144 of ripened cheese, 32 of milk-based infant formulae, 22 of dried whey, and 12 of conc. milk were resp. 80, 690, 95, 150, 430, 115 and 220 ng/kg. Aflatoxin M_1 was detected in only 2 out of 26 samples of butter, in 1 of 5 samples of ice cream and in 1 of 4 samples of caseinate. Contents of aflatoxin M_1 in liquid milk tended to be higher in winter (Dec.–April) when the cows were given feedstuffs containing groundnut oil cake, which favours growth of *Aspergillus flavus* and production of aflatoxins. Legislation in France concerning aflatoxin M_1 in milk, and problems associated with the detection of low amounts of aflatoxins are discussed. MEG

33

Inhibition of aflatoxin formation by some spices.
Mabrouk, S. S.; El-Shayeb, N. M. A.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung **171** (5) 344–347 (1980) [25 ref. En, de] [Lab. of Natural Products, Nat. Res. Cent., Dokki, Cairo, Egypt]

Studies were made of the effect of 5 concn. (0, 0.1, 0.5, 5 and 10 g/100 ml medium) of 6 ground spices (clove, cinnamon, mint, cumin, ginger and black pepper) on the growth of an aflatoxin formation by *Aspergillus flavus* M 93 in a rice powder-corn steep medium incubated at 25°C for 6 days. Results (final pH of medium, mycelium dry wt., contents of aflatoxins B and G in culture filtrate and in mycelium, total aflatoxin content) are detailed in a table and discussed. The effect of all spices except clove was judged to be inhibitory to aflatoxin formation rather than to mycelial growth. Clove at concn. >0.1 g/100 ml completely inhibited both mycelial growth and aflatoxin formation. Aflatoxin production was completely inhibited by mint and cumin at levels of 5 and 10 g/100 ml and by black pepper and ginger at 10 g/100 ml. Some aflatoxin was produced at all levels of cinnamon addition but amounts produced decreased as the cinnamon level increased. Mycelial growth was stimulated by the following levels (g/100 ml) of spices:

10 cinnamon, 0.1–10 mint, 10 cumin, 0.1–10 ginger; all levels of black pepper partially inhibited mycelial growth. The paper concludes by considering which spice constituents may inhibit mycelial growth or aflatoxin production, e.g. eugenol in clove, cinnamic aldehyde in cinnamon, terpenes and their oxidized derivatives in mint, cumin aldehyde and paraldehyde in cumin. JA

34

Novel thin layer chromatographic techniques for aflatoxin analysis.
Kozloski, R. P.
Journal of the Association of Official Analytical Chemists 64 (5) 1263–1264 (1981) [En] [Analytical Chem. Dep., Connecticut Agric. Exp. Sta., New Haven, Connecticut 06504, USA]

Some practical points for improving TLC analysis of aflatoxins are described. Preliminary elution with ethyl ether elutes lipids (from samples such as milk extracts) that would otherwise exceed the TLC plate capacity without altering aflatoxin position. After an unsuccessful chromatographic separation of a scarce sample, the chromatogram may be returned to the original state by developing in the opposite direction with methanol. Diffuse spots may be concentrated by spotting the chromatogram either side of them with methanol. Fluorescence of aflatoxin spots is enhanced under a stream of inert gas. DIH

35

Negative ion chemical ionization mass spectrometry of aflatoxins and related mycotoxins.
Brumley, W. C.; Nesheim, S.; Trucksess, M. W.; Trucksess, E. W.; Dreifuss, P. A.; Roach, J. A. G.; Andrzejewski, D.; Eppley, R. M.; Pohland, A. E.; Thorpe, C. W.; Sphon, J. A.
Analytical Chemistry 53 (13) 2003–2006 (1981) [18 ref. En] [Div. of Chem. & Physics, FDA, Washington DC 20204, USA]

Negative ion chemical ionization mass spectra of aflatoxins and other mycotoxins were obtained under resonance electron capture conditions using methane. The negative ion spectra of aflatoxins consisted of 3 major ions: M^{-}., $(M-H.)^{-}$, and $(M-CH_{3}.)^{-}$. Other mycotoxins related to aflatoxins also exhibited relatively simple spectra. The temp. dependence of the spectra is presented in detail for aflatoxin B_1. The negative ion spectra of aflatoxins were used to demonstrate the feasibility of confirming the presence of aflatoxin B_1 in peanut butter, corn, and other commodities and aflatoxin M_1 in milk after appropriate extraction-cleanup. The aflatoxins were confirmed at levels as low as 10.5 parts/billion in food matrices. AS

36

Thin layer chromatographic determination of aflatoxin in corn dust.
Shotwell, O. L.; Burg, W. R.; Diller, T.
Journal of the Association of Official Analytical Chemists 64 (5) 1060–1063 (1981) [16 ref. En] [N. Reg. Res. Cent., USDA, Peoria, Illinois 61604, USA]

Methods adopted by the AOAC and the American Association of Cereal Chemists for determining aflatoxin in corn were modified, and techniques were developed for application to samples of <1 to 10 g instead of the specified 50 g samples. Analysis included chloroform extraction of dust samples or dust collected from glass fibre filters, purification of extracts on a silica gel column of appropriate size, and measurement of aflatoxin by either 1- or 2-dimensional TLC. The solvent for 1-dimensional TLC was chloroform/acetone/water (91 + 9 + 1). Solvents for 2-dimensional TLC were, first direction, ether/methanol/water (95 + 4 + 1, lined tank) and second direction, chloroform/acetone/water (91 + 9 + 1, unlined tank), or first direction, chloroform/acetone/water (91 + 9 + 1, unlined tank) and second direction, toluene/ethyl acetate/formic acid (60 + 30 + 10, unlined tank). When samples weighed ≤0.1 g, the entire concentrated extract was applied to the TLC plate. About 0.5–1.0 ng aflatoxin B_1 could be detected on the plate, making the limit of detection about 9 ng/g for 0.1 g samples. AS

37

Epidemiological considerations of preharvest infection and aflatoxin production by *Aspergillus flavus* in field corn.
Jones, R. K.
Dissertation Abstracts International, B 41 (12) 4329–4330: Order no. 8111035, 12pp. (1981) [En] [N. Carolina State Univ., Raleigh, N. Carolina 27607, USA]

Infection and aflatoxin B_1 production by *A. flavus* in short-, mid-, and full-season hybrids of field corn were measured in 3 locations of North Carolina. Early planting and harvest (28 vs. 18% moisture) reduced aflatoxin B_1 contents, as did irrigation. A correlation was noted between aflatoxin and reduced yield, so stress conditions may predispose corn to infection. Ability of *A. flavus* to colonize silk tissue and invade developing kernels was examined. Corn produced under N stress was a better substrate for aflatoxin production than corn given adequate N. LH

38

Residues of meats and additives – studies and perspectives. (In *'Meat in nutrition and health'* [see FSTA (1982) 14 4S569].) [Lecture]
Ferrando, R.
pp. 151–176 (1981) [88 ref. En] [Lab. of Nutr. & Feeding. Nat. Vet. Coll., Alfort, France]

This review deals with the sources and hygienic risk of residues in meat, under headings of: residues originating from natural contaminants owing to the infestation of the animals' food by microorganisms productive of mycotoxins; residues originating from pesticides used in agriculture and reaching meats by way of the alimentary chain – the case of heavy metals is also examined; residues originating from additives used in animal feed and medication used in veterinary therapy; substances used in the preparation of meat products, especially pork butchery; perspectives raised by the question of residues on material, sanitary and legislative levels, involving the necessity for a total, objective study. LH

39

The effects of withdrawal and processing upon the levels of aflatoxins in the tissues of pigs fed a contaminated ration.
Furtado, R. M.
Dissertation Abstracts International, B **41** (12) 4441: Order no. 8112081, 162pp. (1981) [En] [Michigan State Univ., E. Lansing, Michigan 48824, USA]

2 trials were conducted to determine the amount of time needed for tissue clearance from pigs fed an aflatoxin contaminated diet (551 or 355 parts aflatoxin B_1 and B_2, resp./billion) for 42 days. Organ wt. and residue levels were measured. High residual concn. of aflatoxin were found in kidney and liver particularly, which were heavier in contaminated carcasses. Heart, muscle, spleen and blood also contained residues. 4 subsequent days on an aflatoxin free diet were enough to reduce residue levels to non-detectable values. Processing and cooking of contaminated meat were not very effective in removing residues. LH

40

Methods for the determination of mycotoxins.
Hunt, D. C.
Analytical Proceedings **18** (11) 471–472 (1981) [8 ref. En] [Lab. of the Gov. Chem., Cornwall House, Stamford Street, London SE1 9NQ, UK]

This paper discusses the effects of and methods of detn. for aflatoxins, ochratoxin A and other mycotoxins, with special attention to HPLC methods. RM

41

Increased aflatoxin production by *Aspergillus parasiticus* under conditions of cycling temperatures.
Park, K. Y.; Bullerman, L. B.
Journal of Food Science **46** (4) 1147–1151 (1981) [13 ref. En] [Dep. of Food Sci. & Tech., Univ. of Nebraska, Lincoln, Nebraska 68583, USA]

The effects of cycling temp. (5°C for 12 h and 25°C for 12 h) on aflatoxin production by *Aspergillus parasiticus* NRRL 2999 in yeast extract sucrose (YES) medium were studied. Cycling temp., after preincubation at 25°C for various times, resulted in more aflatoxin B_1, G_1, and total aflatoxin production than did constant incubation at either 25°C, which is generally considered to be the optimum for aflatoxin production, or 15°C, which is the same total thermal input as the 5–25°C temp. cycling. With increased preincubation time at 25°C, toxin production increased and the lag phase of growth was shortened or not evident. Cultures that were preincubated at 25°C for 1, 2, and 3 days prior to onset of temp. cycling showed the greatest increase in max. aflatoxin production over the 25°C and 15°C constant temp. Cultures that were not preincubated at 25°C but subjected to constantly fluctuating temp. produced max. amounts of aflatoxin equivalent to cultures incubated at a constant 25°C. The max. aflatoxin production at all temp. studied occurred during the late log phase of growth and at pH min. Aflatoxins were found in higher concn. in the broth than the mycelia under temp. cycling conditions, at 15°C, and at 25°C during the first 21 days of incubation, whereas greater amounts of toxin were retained in mycelium at 25°C in the later incubation period (28–42 days). IFT

42

[The mycotoxin problem in tropical countries.]
Ruggiero, M.; Nicastro, C.
Rivista di Agricoltura Subtropicale e Tropicale **74** (3/4) 221–230 (1980) [10 ref. It, en, de]

The dangers to man and animals presented by fungal contamination and mycotoxin production of stored vegetable foods and feeds are surveyed with special reference to tropical conditions. RM

43

Influence of tricarboxylic acid cycle intermediates and related metabolites on the biosynthesis of aflatoxin by resting cells of *Aspergillus flavus*.
Shantha, T.; Sreenivasa Murthy, V.
Applied and Environmental Microbiology **42** (5) 758–761 (1981) [13 ref. En] [Cent. Food Tech. Res. Inst., Mysore 570013, India]

Resting cells of *Aspergillus flavus* synthesized aflatoxin from acetate as the sole carbon source after 36 h of incubation. Addition of pyruvate (5.5 mg/ml) as cosubstrate to $[1\text{-}^{14}C]$acetate and unlabelled acetate considerably reduced toxin production but increased the radioactivity of the tricarboxylic acid intermediates. This suggests that high tricarboxylic acid activity drastically affected toxin synthesis. AS

44

Mycotoxins other than aflatoxins – their relationships to food safety. [Conference proceedings]
United States of America, American Society for Microbiology
Journal of Food Protection **44** (9) 701–726 (1981) [many ref. En]

4 papers are published that were presented at a symposium held during the 80th Annual Meeting of the American Society for Microbiology, 11–16 May 1980, at Miami Beach, Florida. An introduction, by L. B. Bullerman and R. L. Buchanan (pp. 701, 710) precedes the papers, which can be found in the FSTA author index under **United States of America,** American Society for Microbiology [Mycotoxin Symposium]. DIH

45

The aflatoxin contents of locally consumed foodstuffs. IV. Millet.
Opadokun, J. S.
Annual Report, Nigerian Stored Products Research Institute 1977/1978, 83–85 (1980) [2 ref. En]

Moisture and aflatoxin B_1 contents were determined in 50 samples of millet purchased at Kano markets between April and Dec. 1977. Tabulated results showed that all samples had moisture contents below the 'safe' level of 16% (4.76–12.58%). 4 samples taken during the wettest period had aflatoxin B_1 contents >20 parts/billion, max. 160 parts/billion. RM

46

The aflatoxin contents of locally consumed foodstuffs. V. Milk
Opadokun, J. S.; Okoye, W. I.; Kazaure, F.
Annual Report, Nigerian Stored Products Research Institute **1977/1978,** 87–90 (1980) [3 ref. En]

The aflatoxin M_1 content of 92 samples of milk from Kano dairy farms (raw milk from local farmers, raw milk from the Kano dairy farm, pasteurized milk and yoghurt from the Kano dairy farm) was determined. Tabulated results showed no detectable aflatoxin M_1 (detection level 0.2 μg/l) in any sample. [See preceding abstr. for part IV.] RM

47

Determination of aflatoxin B_1 in corn, wheat, and peanut butter by enzyme-linked immunosorbent assay and solid phase radioimmunoassay.
El-Nakib, O.; Pestka, J. J.; Chu, F. S.
Journal of the Association of Official Analytical Chemists **64** (5) 1077–1082 (1981) [19 ref. En] [Dep. of Food Microbiol. & Toxicology, Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Determinations of aflatoxin B_1 in corn, wheat, and peanut butter by an enzyme-linked immunoassay (ELISA) and a solid-phase radioimmunoassay (RIA) were compared. Samples spiked with 2.9–43.2 ng/g B_1 were subjected to AOAC extraction procedure 26.017 or 26.023. The extracts were concentrated, redissolved in methanol, diluted in phosphate-buffered saline with Tween 20, and directly analysed for B_1 by either ELISA or RIA. At $\geq$5.8 ng/g, recoveries for B_1 in corn, wheat, and peanut butter samples were 80.0, 86.6 and 94.8% by ELISA and 61.0, 93.3 and 110.0% by RIA, resp. Recoveries >120% were obtained for the wheat and peanut butter samples spiked with 2.9 ng/g aflatoxin B_1 by the RIA method but not by ELISA. Overall results indicated that ELISA gave more consistent data, relatively lower s.d. and lower coeff. of variation than did RIA. Analysis of 3 samples naturally contaminated with aflatoxins revealed that the ELISA data were comparable to those obtained by other established chemical methods. AS

48

High performance liquid chromatographic determination of aflatoxicol in milk, blood and liver.
Trucksess, M. W.; Stoloff, L.
Journal of the Association of Official Analytical Chemists 64 (5) 1083–1087 (1981) [13 ref. En] [Div. of Chem. & Physics, FDA, Washington, DC 20204, USA]

Samples of milk were extracted with chloroform, the extract was transferred to methanol, and residual interferences were removed by liquid-liquid partition against hexane and by silica gel column chromatography. Aflatoxicol (AFL) in the purified extract was resolved on a μBondapak C_{18} column, using water/methanol/acetonitrile/tetrahydrofuran (70 + 15 + 20 + 3) as the mobile phase, and measured with a fluorescence detector (excitation 325–385 nm, emission >408 nm). Recoveries of AFL added to samples of whole pasteurized milk at levels ranging from 0.025 to 0.10 ng/ml averaged 92% (range 78–100%). The method for AFL was also applied to the analysis of raw milk, whole beef blood, and beef liver, with recoveries of 70–88%. AS

49

Sterigmatocystin and other mycotoxins produced by *Aspergillus* species. [Lecture]
Davis, N. D.
Journal of Food Protection **44** (9) 711–714, 722 (1981) [29 ref. En] [Dep. of Botany, Plant Path. & Microbiol., Auburn Univ., Auburn, Alabama 36849, USA]

A review is made of the food toxicants sterigmatocystin and ochratoxin A, covering biological effects, causative organisms, natural occurrence of the organisms and the toxins and analytical methods. Other *Aspergillus* toxins, whose significance as hazards to human health is less understood, are listed. [See FSTA (1982) 14 5C196.] DIH

50

[Mycotoxin-forming moulds as agents of fruit decay.]
Mykotoxinbildende Schimmelpilze als Verderber von Früchten. [Review]
Frank, H. K.
Erwerbsobstbau **22** (9) 196–199 (1980) [48 ref. De] [Inst. für Biologie, Bundesforschungsanstalt für Ernährung, 7500 Karlsruhe 1, Federal Republic of Germany]

Aspects covered in this review of microbial fruit decay include: the fungi acting as toxinogenic agents of fruit decay, and toxicity of the various toxins produced; routes of infection; consequences of toxin-containing mouldy fruit, including patulin in juices and economic consequences for the fruit producer; and possibilities of prevention of mycotoxin formation. DIH

51

[Formation of mycotoxin in mouldy fruit.] Zur Bildung von Mycotoxinen in befallenen Früchten. [Review]
Röschenthaler, R.
Erwerbsobstbau **22** (10) 222–226 (1980) [42 ref. De] [Inst. für Mikrobiologie, Univ. Münster, 4400 Münster, Federal Republic of Germany]

After a discussion of formation of mycotoxins in general, this review covers the following aspects: mycotoxins actually found in fruits; patulin in fruits and fruit juices; detection of patulin and quantities present; aflatoxins in fruits; and prevention of contamination of fruits with mycotoxins. DIH

52

Analysis of aflatoxins in peanuts by high pressure liquid chromatograph.
Otto, S. E.; Dunmire, D. L. (Peanut Research & Testing Laboratories Inc.)
United States Patent 4 285 698 (1981) [En]

Method is described for quickly and easily determining the presence and concn. of aflatoxins in groundnuts. Aflatoxins are extracted from ground groundnuts with a methanol/water solution using a tissuemizer. The extracted sample is filtered and an aliquot of the filtrate is transferred to a separatory funnel. A salt solution is added to remove interferences. The combined aqueous solution is then extracted with dichloromethane. The dichloromethane extract is evaporated to dryness, trifluoroacetic acid is then added and the resulting residue taken up in the mobile phase. The solution is then passed through a minicolumn for filtration and final cleanup. An aliquot is then injected into a high pressure liquid chromatograph system for separation of the 4 aflatoxin components, B_1, B_2, G_1 and G_2. Quantitation is performed using a filter fluorescence detector. AS

53

Aspergillus parasiticus growth and aflatoxin production on dehydrated taro.

Tsai, W. Y. J.; Moy, J. H.; Nip, W. K.; Frank, H. A.

Journal of Food Science 46 (4) 1167–1169 (1981) [20 ref. En] [Dep. of Food Sci. & Human Nutr., Univ. of Hawaii, Honolulu, Hawaii 96822, USA]

A study was made of *Aspergillus parasiticus* growth and aflatoxin production on 4 taro (a high-yielding tropical root crop used as a staple carbohydrate food) media. The critical equilibrium relative humidity (ERH) for natural mould growth on unsterilized dehydrated taro was 88% at 20°C. However, nontoxigenic *A. parasiticus* NRRL 1957 did not grow at this ERH on dehydrated raw taro incubated at 20°, 30°, or 40°C. Instead, its growth was optimum at 30°C and an ERH of 96%. Aflatoxin production by toxigenic *A. parasiticus* NRRL 2999 was investigated on 4 taro media under optimal growth conditions. Only moderate quantities of aflatoxins were produced on uncooked dehydrated taro, but cooking or supplementation with peptone stimulated mycelial growth and aflatoxin production slightly. Nevertheless, growth and aflatoxin production on cooked or peptone-supplemented taro media was low. IFT

54

Improved fluorometric-iodine method for determination of aflatoxin in corn.

Davis, N. D.; Guy, M. L.; Diener, U. L.

Journal of the Association of Official Analytical Chemists 64 (5) 1074–1076 (1981) [6 ref. En] [Dep. of Botany, Agric. Exp. Station, Auburn Univ., Auburn, Alabama 36849, USA]

Several innovations in the fluorometric-iodine (FL-I) method for determining aflatoxin in corn made the procedure faster and more convenient than the original method. Ground corn was packed into a chromatographic column and the aflatoxins were extracted with methylene chloride. Sep-Pak C_{18} cartridges were used for sample cleanup. A 5 min TLC slide analysis confirmed the presence of aflatoxin, which was quantitated by fluorometric determination of the iodine derivative of aflatoxin B_1. AS

55

Behaviour of aflatoxin M_1 during milk biscuits processing.

Duflot, G.

Sciences des Aliments 1 (4) 541–550 (1981) [15 ref. En, fr] [Int. Training + Res. Cent. Inc., 15–17 avenue de l'Europe, 02400 Chateau-Thierry, France]

Several preliminary tests led to a study of aflatoxin behaviour during the various stages of biscuit processing (mixing, laminating, baking) using 2 full cream milk powders, (i) a naturally contaminated powder with 10 µg aflatoxin M_1/kg, or (ii) an artificially contaminated powder with 50 µg M_1/kg. (i) contained 0.5 µg M_1/kg after mixing, laminating, cutting and 2 min baking, and <0.05 µg/kg from 3–6 min baking (at a toxin recovery rate of approx. 50%). (ii) contained 4.0 µg M_1/kg after processes up to 2 min baking, and from 3–6 min baking contained 0.9, 0.6, 0.2, and 0.2 µg/kg, resp. Thus mixing degrades the toxin slightly, and heavy losses are incurred during the first third of the baking process. LH

56

Rapid screening method for aflatoxin M_1 in milk.

Holaday, C. E.

Journal of the Association of Official Analytical Chemists 64 (5) 1064–1066 (1981) [4 ref. En] [Nat. Peanut Res. Lab., USDA, PO Box 637, Dawson, Georgia 31742, USA]

A rapid screening method for detecting aflatoxin M_1 in milk was developed, based on minicolumn chromatography and requiring 8–10 min for each test. The minicolumn is packed with dry Florisil (100–200 mesh) on the bottom, anhydrous Na_2SO_4 as the next layer, topped with neutral alumina (70–200 mesh) to which 8% water (wet basis) has been added. A blue fluorescent band at the Florisil-Na_2SO_4 interface indicates the presence of aflatoxin M_1. The limit of detection is estimated to be approx. 0.2 µg/kg. Because several items are disposable, both the time to maintain glassware and the cost/detn. are reduced. AS

57

[Mycotoxins in cheese.] [Review]

Josefsson, E.

Var Föda 33 (6) 237–248 (1981) [43 ref. Sv, en] [Livsmedelslab., Statens Livsmedelsverk, 751 26 Uppsala, Sweden]

The literature on mycotoxins in cheese is reviewed, with a comprehensive tabular compilation of data on mycotoxins in blue veined cheese, Camembert cheese and cheeses contaminated with adventitious moulds. In blue-veined and Camembert cheese, toxins such as roquefortine, isofumigaclavin A or B, mycophenolic acid and cyclopiazonic acid may be formed by the *Penicillium roqueforti* and *P. camemberti* cultures added to the cheese milk during manufacture. In other cheeses, mycotoxins may originate from the primary production of milk on the farm (especially aflatoxin M_1) or from adventitious moulds which grow on the cheese during storage (e.g. sterigmatocystin formed by *Aspergillus versicolor*). The spread of toxins from mouldy parts of the cheese is discussed, and factors affecting mould growth and toxin formation are considered. Finally, details are given of the toxic properties of the main mycotoxins (aflatoxin B_1 and M_1, cyclopiazonic acid, etc.). ADL

58

[Effect of aflatoxin B_1 on development of microorganisms during ripening of Trappist cheese.]
Obradovic, D.; Nikolin, A.; Sutic, M.; Davitkov, A.
Mljekarstvo 31 (4) 111–118 (1981) [9 ref. Sh, en] [Poljoprivredni Fak., Belgrade, Yugoslavia]

Trappist cheeses were made by customary procedures from (i) normal milk or (ii) from milk with aflatoxin B_1 added at 32 µg/l. Half of each batch was ripened at 10–12°C by the usual method, and half packaged in plastics film; milks, cheese curds, and cheeses ripened for 13, 26, 36 and 47 days were examined microbiologically. Results of counts of total bacteria, streptococci, lactobacilli, and micrococci showed that aflatoxin prolonged milk coagulation and reduced total bacterial counts in the curds, but had a slightly stimulatory effect on development of cheese microflora during ripening. SKK

59

High pressure liquid chromatographic determination of aflatoxins in spices.
Awe, M. J.; Schranz, J. L.
Journal of the Association of Official Analytical Chemists 64 (6) 1377–1382 (1981) [15 ref. En] [Stange, Co., 342 N. Western Avenue, Chicago, Illinois 60612, USA]

HPLC with fluorescence detection is used to determine aflatoxin in 5 common spices. A 10 µm microparticulate silica gel column is used with a dichloromethane-cyclohexane/acetonitrile solvent system to resolve aflatoxins B_1, G_1, B_2, and G_2. The fluorescence detector contained a silica gel-packed flowcell. Samples of black, white, and red pepper, ginger, and nutmeg were extracted according to a previously published method. Recoveries from aflatoxin-free samples of white pepper, ginger, and red pepper spiked with 1–50 µg aflatoxin/kg ranged from 64 to 92%. AS

60

Survey of selected mycotoxins in food.
Fritz, W.; Engst, R.
Journal of Environmental Science and Health, B B16 (2) 193–210 (1981) [31 ref. En] [Cent. Inst. of Nutr. of the Academy of Sci. of the GDR, Potsdam-Rehbrücke, 1505 Bergholz-Rehbrücke, Arthur-Scheunert-Allee 114–116, German Democratic Republic]

Aflatoxins B_1, B_2, G_1, G_2, and M_1, ochratoxin A, patulin, and byssochlamic acid were analysed in various foods by solvent extraction; purification by TLC or column chromatography; separation by 2-dimensional TLC; detn. by fluorescence densitometry and spectrophotometric fluorimetry. Results are tabulated. Foods examined (moulded and nonmoulded) included: peanuts and peanut products, milk and dairy products, grain and cereal products, fruit and fruit products, and coffee. Toxicological consequence of mycotoxins in food, and possibilities to reduce present levels in food are discussed. LH

61

Regulation of aflatoxin biosynthesis: effect of exogenously supplied cyclic nucleotides.
Tice, G.; Buchanan, R. L.
Journal of Food Science 47 (1) 153–157 (1982) [En] [Dep. of Nutr. & Food Sci., Drexel Univ., Philadelphia, Pennsylvania 19104, USA]

Effects of cyclic AMP, cyclic GMP, AMP, and GMP on aflatoxin accumulation were studied using flask and test tube cultures of *Aspergillus parasiticus*. The response to cyclic GMP supplementation was variable, depending on the type of culture system employed. Cyclic AMP produced a dose-related increase in aflatoxin production, with 5.0 mM supplementation resulting in as much as an 18-fold increase in toxin accumulation. Stimulation of aflatoxin production by cyclic AMP was not attributable to nutritional effects, and the results suggest that cyclic AMP may be a key regulatory control point governing aflatoxin biosynthesis. IFT

62

Presence of aflatoxins in foods and feeds available in the Tamil Nadu region.
Neelakantan, S.; Balasubramanian, T.; Indira Jasmine; Balasaraswathi, R.
Madras Agricultural Journal 68 (3) 189–195 (1981) [14 ref. En] [Dep. of Food Tech., Tamil Nadu Agric. Univ., Coimbatore - 647 003, India]

Various food products (groundnut candy, dates, areca nut, pickles, dried vegetables, apples and dried coconut) and feeds procured from local markets were analysed for aflatoxin content by TLC. Results showed that several samples were found to be contaminated by aflatoxin B_1 and/or B_2. Similar results were also obtained with animal feed ingredients. CFTRI

63

[The principal mycotoxins and their importance in foods.] [Review]
Bechet, J.; Thonart, P.
Actualites Scientifiques et Techniques dans les Industries Agro-alimentaires, Centre de Documentation Internationale des Industries Utilisatrices de Produits Agricoles No. 20, 166pp. (1978) [441 ref. Fr]

This publication gives extensive reviews on the main mycotoxins, organisms producing them, conditions for toxin production, structure, toxicity/carcinogenicity, foods susceptible to contamination, and methods for detection and analysis. Mycotoxins considered include aflatoxins, sterigmatocystin, ochratoxins, toxins formed by *Fusarium* spp. (trichothecenes, zearalenone and its derivatives), patulin, penicillic acid, citrinin, 'yellow rice' toxins, ergot, rubratoxins, *Alternaria* spp. toxins, tremorgens, *Penicillium roqueforti* toxin, sporidesmins, malformins, and *Byssochlamys* spp. toxins. AJDW

64

Blood α-fetoprotein changes in rats fed aflatoxin B_1 and various levels of cabbage.

Boyd, J. N.; Stoewsand, G. S.

Journal of Food Science 46 (6) 1923–1926 (1981) [En] [Dep. of Food Sci. & Tech., Cornell Univ., New York State Agric. Exp. Sta., Geneva, New York 14456, USA]

Weanling male Fischer rats were fed semi-purified diets containing 0, 5, 10, 20 or 30% freeze-dried ground cabbage for 11 wk. "Control" groups received no aflatoxin B_1 (AB_1); "Ad lib AB_1" groups received 1 p.p.m. AB_1 in the diets; and "Meal-fed AB_1" groups received 2 weekly "meals" of AB_1 in 3–5 g of purified diet. The amounts of AB_1 consumed/wk was the same for both AB_1 treated groups. Blood levels of α-fetoprotein (AFP), an onco-developmental gene product, were in the order: "Meal-fed AB_1" > "Ad-lib AB_1" > "Control". Inhibition of AFP elevation by cabbage diets in both AB_1-treated groups suggested that this vegetable may produce a hepatocarcinogenic protective effect. This effect has been observed in rats fed cauliflower. Inhibition of AFP induction was correlated with increasing levels of dietary cabbage up to 20%. Cabbage diets also resulted in decreased intestinal transit time and increased relative liver wt. IFT

65

[The aflatoxin situation in various foods.] Zur Aflatoxin-Situation in verschiedenen Lebensmitteln.

Woller, R.; Majerus, P.

Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 72 (4) 437–440 (1981) [12 ref. De, en, fr] [Chemisches Untersuchungsamt Trier, Maximineracht 11a, D-5500 Trier, Federal Republic of Germany]

441 samples of nuts and seeds were analysed for presence of aflatoxins. Of 187 samples of hazelnut kernels, 2 mouldy kernels contained 10 and 67 µg aflatoxin B_1/kg (equivalent to 0.4 and 1.9 µg/kg retail pack). 20 samples of hazelnut kernel meal were free of aflatoxin. Of 104 walnut samples, 100 were free of aflatoxin, 3 contained 1–4 µg aflatoxin B_1/kg and 1 contained 7 µg aflatoxin B_1/kg and 18 µg total aflatoxin/kg. No aflatoxins were detected in 74 samples of coconut flakes, 26 of poppy seed or 26 of sesame seed. DIH

66

A critical review of biological methods for the detection of fungal toxins in foods and foodstuffs. [Review]

Watson, D. H.; Lindsay, D. G.

Journal of the Science of Food and Agriculture 33 (1) 59–67 (1982) [78 ref. En] [Food Sci. Div., Min. of Agric., Fisheries & Food, Great Westminster House, Horseferry Road, London SW1P 2AE, UK]

Many biological assays (bioassays) have been developed to detect fungal toxins (mycotoxins). Few of these assays are as sensitive to mycotoxins as chemical assays or have been shown to be able to detect a wide range of different mycotoxins. Bioassays also suffer from a number of other problems including interference by non-fungal agents and from often being slow and less reproducible than chemical assays for mycotoxins. Bioassays have given little valuable information in their use in the surveillance of food and foodstuffs. Their major value has been in the initial identification and isolation of mycotoxins. AS

67

[Food hygiene and imported foodstuffs – with particular reference to mycotoxins.]

Udagawa, S.

New Food Industry [Nyu Fudo Indasutori] 23 (3) 16–18 (1981) [Ja] [Microbiol. Sect., National Hygiene Lab., Tokyo, Japan]

Between 1968 and 1977, the proportion of foodstuffs imported into Japan that were subjected to inspection annually varied between 4 and 10%. After an increase in the proportion of inspections in 1974 the rate has continued to decline in the face of a steeply rising volume of imports. Specific dangers from mycotoxin (particularly aflatoxin) contamination of foodstuffs from various parts of the world, are considered; a tighter inspection system is proposed. CIH

68

Absorption of aflatoxin by lettuce seedlings grown in soil adulterated with aflatoxin B_1.

Mertz, D.; Edward, T.; Lee, D.; Zuber, M.

Journal of Agricultural and Food Chemistry 29 (6) 1168–1170 (1981) [9 ref. En] [Div. of Biol. Sci., Univ. of Missouri-Columbia, Columbia, Missouri 65211, USA]

The objective of this study was to determine whether seedling plants accumulate aflatoxin B_1 (AFB_1) from soils that had been contaminated with the toxin. The results of this study are of major interest due to the large amount of aflatoxin-contaminated plant material that is often disposed of by returning it to the soil. Two-day-old lettuce seedlings were transplanted to a loam soil that had been adulterated with AFB_1. Following a growth period of 7–12 days, aflatoxin was recovered from leaf-stem and root tissue. The amount of AFB_1 recovered represented only a small percentage (0.2–0.8%) of the total toxin that had been previously added to the soil; nevertheless, the uptake by seedlings suggests that absorption of the toxin could constitute a health hazard to consumers of agricultural commodities grown on soils that had been contaminated with aflatoxin. AS

69

Stimulation of aflatoxin production in media supplemented with taro.

Tsai, W. Y. J.; Moy, J. H.; Nip, W. K.; Frank, H. A.

Journal of Food Science 46 (4) 1274–1275 (1981) [5 ref. En] [Dep. of Food Sci. & Tech., Univ. of Nebraska, Lincoln, Nebraska 68583, USA]

The effect of taro (*Colocasia esculenta*, a carbohydrate staple) supplementation on aflatoxin production by *Aspergillus parasiticus* was studied on wheat and in the liquid synthetic glucose-low salts (GLS) medium of Adye and Mateles [*Biochimica et Biophysica Acta* (1964) 86, 418]. Wheat containing added taro extract had 30% more aflatoxins. Adding 5% uncooked or cooked taro shreds to the liquid GLS medium increased toxin production 2- to 3-fold. IFT

70

[Contamination of maize grain by fungi and aflatoxin.]
Halt, M.
Hrana i Ishrana 22 (5/6) 119–120 (1981) [Sh, en] [Prehrambeno-tehnicki Fak., Osijek, Yugoslavia]

Of 43 samples of maize grain stored by various methods, 22 (51.2%) contained *Aspergillus flavus;* of these, 17 (77.3%) contained aflatoxin B_1, at levels of 5-60 µg/kg. IN

71

Mycotoxins in cereal grain. III. Production of ochratoxin A in different varieties of wheat, rye and barley.
Chelkowski, J.; Dopierala, G.; Godlewska, B.; Radomyska, W.; Szebiotko, K.
Nahrung 25 (7) 625–629 (1981) [10 ref. En, de, ru] [Agric. Univ., Inst. of Food Tech. of Plant Origin Commodities, Poznan, Poland]

Samples of disinfected cereal kernels (wheat, rye, barley) were contaminated with spores of *Aspergillus ochraceus.* After 4 wk incubation at 15°C the ochratoxin A content of the samples was determined. Var. differed in resistance to mould growth and ochratoxin A formation. Zn was shown to be a limiting factor in toxin synthesis. Generally, healthy kernels capable of germination had high mould resistance; kernels incapable of germination (e.g. autoclaved) had low mould resistance. Selection of cereal varieties with high mould resistance and satisfactory transport and storage conditions are recommended to reduce mycotoxin formation and losses due to moulds. [See FSTA (1982) 14 3M391 for part II.] IN

72

Walter A. Pons, Jr. memorial symposium on mycotoxins presented at the 72nd annual meeting of the American Oil Chemists' Society held in New Orleans, Louisiana, Fairmont Hotel, May 19–20, 1981 [Conference proceedings]
United States of America, American Oil Chemists' Society
Journal of the American Oil Chemists' Society 58 (12) 927A–1022A (1981) [many ref. En]

This symposium contains papers on: Replacement of benzene as a solvent for aflatoxin standards, by J. Velasco (pp. 938A–940A, 2 ref.). Isolation of altenuisol and altertoxins I and II, minor mycotoxins elaborated by *Alternaria,* by F. S. Chu (pp. 1006A-1008A, 6 ref.). A further 15 papers are abstracted separately and can be found in the author index under United States of America, American Oil Chemists' Society [Mycotoxins Symposium]. LH

73

Minicolumn chromatography: state of the art. [Lecture]
Holaday, C. E.
Journal of the American Oil Chemists' Society 58 (12) 931A–934A (1981) [15 ref. En] [Nat. Peanut Res. Lab., USDA, S.E. Area, PO Box 637, Dawson, Georgia 31742, USA]

The state of the art of minicolumn (MC) chromatography, as related to mycotoxin detn., is surveyed under headings of: development of the minicolumn method for aflatoxin, development of a combined MC procedure for aflatoxin and ochratoxin A, development of an MC method for zearalenone, development of an MC method for aflatoxin M, potential of the MC chromatography technique. [See FSTA (1982) 14 7B96.] LH

74

Rapid analysis for aflatoxins in cottonseed products with silica gel cartridge clean-up. [Lecture]
McKinney, J. D.
Journal of the American Oil Chemists' Society 58 (12 935A–937A (1981) [5 ref. En] [Ranchers Cotton Oil, PO Box 2596, Fresno, California 93745, USA]

A proposed rapid and versatile method of analysis for aflatoxins in cottonseed products using Waters Associates' Sep-Pak silica cartridge clean-up is presented. Samples are extracted with acetonitrile/water azeotrope and a filtered aliquot is evaporated to dryness. A toluene/acetonitrile (96:4) solution of the dry extract is applied to a Sep-Pak column. Gossypol derivatives and other artifacts are eluted with chloroform/ethyl ether (1:4). The Sep-Pak is then mated with either a Romer minicolumn for rapid minicolumn application or a small column of acid alumina deactivated with 4% water to produce a clean extract for quantitation by TLC [See FSTA (1982) 14 7B96.] AS

75

Aflatoxin survey of maize from the 1978 crop in the South Burnett region of Queensland.
Blaney, B. J.
Queensland Journal of Agricultural and Animal Sciences 38 (1) 7–12 (1981) [21 ref. En] [Anim. Res. Inst., Dep. of Primary Ind., Yeerongpilly, Queensland, Australia]

A rapid screening test was applied to 805 samples from the 1978 Queensland maize crop. Aflatoxins were detected in 15 of 140 samples containing 5 to 20 bright, greenish-yellow fluorescent (BGY) positive particles. Total aflatoxin levels ranged from 0.005 mg kg^{-1} to 0.34 mg kg^{-1} while aflatoxin B_1 ranged from 0.002 mg kg^{-1} to 0.15 mg kg^{-1}. In 70 samples selected at random from samples containing $<$ BGY fluorescent particles, 2 samples contained 0.005 and 0.008 mg kg^{-1} total aflatoxins resp. The 17 samples in which aflatoxins were detected were obtained from 15 growers representing all 5 growing areas in the study. VJG

76

[Changes in ultraviolet spectra and relative intensity of fluorescence of aflatoxin B_1 in aqueous alkaline solutions.]
Itoh, Y.; Morishita, Y.; Aibara, K.
Journal of the Agricultural Chemical Society of Japan [Nihon Nogei Kagakkai-shi] 54 (9) 733–740 (1980) [9 ref. Ja, en] [Dep. of Biomedical Res. on Foods, Nat. Inst. of Health, Shinagawa-ku, Tokyo 141, Japan]

77

Confirmation of identity of aflatoxins. [Lecture]
Nesheim, S.; Brumley, W. C.
Journal of the American Oil Chemists' Society 58 (12) 945A–949A (1981) [48 ref. En] [Div. of Chem. & Physics, FDA, Washington, DC 20204, USA]

The research to date on a technique for confirmation of suspect aflatoxin contamination in foods is described. Techniques are based on biological activity, physical properties, chemical properties and mass spectrum. [See FSTA (1982) 14 7B96.] LH

78

Pons scaled-down clean-up column adapted for use in solvent-saving modification of the CB method for aflatoxin. [Lecture]
Lee, L. S.; Catalano, E. A.
Journal of the American Oil Chemists' Society 58 (12) 949A–951A (1981) [8 ref. En] [S. Reg. Res. Cent., USDA, New Orleans, Louisiana 70179, USA]

The solvent-saving procedure devised by Pons, using a small chromatographic tube, was adapted for use in modifications of the official AOAC procedure for detn. of aflatoxins in corn, peanuts, soybeans, coconut and pistachios. Toxins (from 3 to > 1000 μg/g) were measured after clean-up by the original and modified procedures, and no statistically significant differences were observed. Tables are given, listing the aflatoxin content of the mentioned foods; toxins B_1, B_2 and G_1 were detected. [See FSTA (1982) 14 7B96.] LH

79

Preparation and characterization of aflatoxin B_{2a}-hemiglutarate and its use for the production of antibody against aflatoxin B_1.
Lau, H. P.; Gaur, P. K.; Chu, F. S.
Journal of Food Safety 3 (1) 1–13 (1980) [17 ref. En] [Dep. of Food Microbiol. & Toxicology, Univ. of Wisconsin-Madison, Madison, Wisconsin 53706, USA]

Hemisuccinate (HS) and hemiglutarate (HG) of aflatoxin B_{2a} (B_{2a}) were prepared by refluxing B_{2a} with the corresponding anhydride and 4-*N,N*-dimethylaminopyridine in tetrahydrofuran. 2 epimers of the respective HS or HG which show different chromatographic behaviour and physicochemical properties were isolated and characterized. B_{2a}-HS hydrolysed very rapidly in aqueous solution and was not used for further study. B_{2a}-HG hydrolysed at a much slower rate and was selected for the coupling to protein. Using the mixed anhydride method, as much as 12 moles of B_{2a}-HG were conjugated to each mole of bovine serum albumin (BSA). The antibody obtained from rabbits immunized with B_{2a}-HG BSA was most specific to aflatoxin B_1 and showed little cross reaction with aflatoxin G_1 and aflatoxicol. The lower limit for detection of aflatoxin B_1 by radioimmunoassay

80

[Methods of mycotoxin analysis in foods.] [Review]
Jemmali, M.
Oleagineux 35 (7) 357–364 (1980) [33 ref. Fr, en, es] [INSERM, 16 Rue Nicolas-Fortin, 75013 Paris, France]

This review discusses: criteria for selecting official methods of mycotoxin analysis; mycotoxin research and detn.; detn. of conjugated mycotoxins; factors affecting the results and precautions necessary for accurate analysis; and legislation. Special attention is given to sampling methods. Extraction, purification, separation, identification, detection and detn. methods are briefly described. RM

81

Aflatoxin in almonds.
Phillips, D. J.; Purcell, S. L.; Stanley, G. I.
Science and Education Administration, United States Department of Agriculture ARM-W-20, 11pp. (1980) [46 ref. En] [W. Region SEA Agric. Res., Fresno, California 93747, USA]

The occurrence and control of aflatoxin production in almond kernels are discussed. Aflatoxins in almond kernels are associated with damage by navel orangeworm larvae, high temp. and moisture in split hulls, which favour the growth of toxigenic *Aspergillus flavus* and *A. parasiticus*. Toxin production is influenced by the kind of fungi on the hull, temp., available moisture and maturity of the hull or kernel. Reduction of insect damage after hull-split and during drying of the fruit would be the most practical method of reducing aflatoxin contents of almonds in the orchard. Cool, dry storage conditions help to maintain the quality of sound kernels. RM

82

Decontamination of aflatoxin-contaminated peanut meal using monomethylamine:$Ca(OH)_2$. [Lecture]
Park, D. L.; Jemmali, M.; Frayssinet, C.; LaFarge-Frayssinet, C.; Yvon, M.
Journal of the American Oil Chemists' Society 58 (12) 995A–1002A (1981) [10 ref. En] [FDA, Rockville, Maryland 20857, USA]

Radiolabelled aflatoxin B_1 was added to naturally contaminated peanut meal, and the fate of aflatoxin-related by-products after decontamination by monomethylamine:$Ca(OH)_2$ was monitored. The decontamination process resulted in a 94–100% reduction in aflatoxin levels, depending on the level of contamination and the chemical structure of the aflatoxin. Following air drying and extractions with chloroform/water, methanol, acetic acid and water, the majority (69–86%) of the decontamination by-products remained with the residue. Significant amounts of aflatoxin B_1 (12%) and aflatoxin-related compounds (27%) were liberated from the residue after enzymic digestion. Isolation and identification studies revealed a wide variety of aflatoxin-related decontamination by-products. HPLC and TLC of chloroform-soluble compounds revealed compounds that exhibited some degree of toxicity. Comparative toxicity tests showed that, although some decontamination by-products exhibited elevated responses to specific toxicity tests, the relative toxicity was inferior to aflatoxin B_1. The moisture, protein and N levels did not change significantly. There was a significant change in the

83

Reducing aflatoxin contamination in peanut genotypes by selection and breeding. [Lecture]

Mixon, A. C.

Journal of the American Oil Chemists' Society 58 (12) 961A–966A (1981) [68 ref. En] [USDA, Coll. of Agric. Exp. Sta., Univ. of Georgia, Coastal Plain Sta., Tifton, Georgia 31793, USA]

The potential for developing agronomically suitable cv. using peanut genotypes that exhibit resistance to seed colonization by aflatoxin-producing strains of *Aspergillus* sp. was explored. Some factors found to be associated with the nature of resistance to seed colonization by the toxin-producing fungi were cell structure, cell arrangement, permeability, waxy surface, tannin content and amino acid components of the seed testae. The practical implications of developing resistant cv. are presented in data for yield, value and seed quality for 6 advanced peanut lines that were developed by breeding and selection from crosses. [See FSTA (1982) 14 7B96] AS

84

Tolerance to in vitro accumulation of aflatoxins in pecan meal as affected by factors associated with yield (*Carya illinoensis* [Wangenh.] K. Koch). [Lecture]

McMeans, J. L.

Journal of the American Oil Chemists' Society 58 (12) 983A–985A (1981) [20 ref. En] [Nat. Peanut Res. Lab., USDA, PO Box 637, Dawson, Georgia 31742, USA]

Individual 50–60 yr old 'Money-maker' pecan trees were selected, (i) 10 with high and (ii) 10 with low nut yields. Nuts were harvested from both, dried, shelled, frozen and subsequently analysed for presence of aflatoxin and their ability to support growth of *Aspergillus parasiticus*. Total aflatoxins produced in the growth media (pecan meal-based) were determined by TLC; total phenolics and mineral concn. were also evaluated in pecan kernel meal; cold pressed pecan oils were examined by GLC. Results are tabulated. (i) contained (in meal from kernels) Mg, Ca, Mn, Cu, Fe and Zn resp. at (μg/g) 1165, 551, 49, 10, 19 and 48 vc. 1028, 471, 49, 9, 14 and 34 resp. in (ii). Total oil % in (i) and (ii) was 66 and 73 resp.; refractive index was 1.46497 and 1.46342; fatty acids detected were myristic (0.06 and 0.06% of total fatty acids in (i) and (ii), resp.), palmitic (6.9 and 6.3), stearic (0.7 and 0.8), oleic (53.6 and 69.4), linoleic (36.6 and 21.9), linolenic (1.9 and 1.2). Significantly greater concn. of aflatoxins (B_1, B_2, G_1 and G_2) occurred in substrates from (i), suggesting that yield and tolerance to aflatoxing contamination may be linked. [See FSTA (1982) 14 7B96.] LH

85

Evaluation of the peanut administrative committee testing program for aflatoxin in shelled peanuts.

Whitaker, T. B.; Dickens, J. W.

Peanut Science 6 (1) 7–9 (1979) [8 ref. En] [USDA, SEA, Biol. & Agric. Eng. Dep., N. Carolina State Univ., Raleigh, N. Carolina 27650, USA]

Under provisions of a USDA Marketing Agreement, an aflatoxin control programme for peanuts produced in the USA is administered by the Peanut Administrative Committee (PAC) composed of peanut growers and shellers. The PAC requires aflatoxin tests on all commercial lots of shelled peanuts. The present PAC testing programme initiated in 1975 was evaluated for Crop A which averaged 9.5 parts-per-billion (ppb) aflatoxin and for Crop B which averaged 5.2 ppb aflatoxin. For Crop A and Crop B, resp., 7.3% and 2.0% of the lots were rejected. The accepted lots contained an average of 7.5 ppb for Crop A and 4.7 ppb for Crop B. A correct decision (accept a lot with ≤25 ppb aflatoxin and reject a lot with >25 ppb aflatoxin) was made 95% of the time for Crop A and 98% of the time for Crop B. AS

86

[Aflatoxins in peanuts and peanut products.]

Aflatoxine in Erdnüssen und Erdnusserzeugnissen.

Woller, R.; Majerus, P.

Zeitschrift für Lebensmittel-Technologie und -Verfahrenstechnik 32 (7) 283–285 (1981) [23 ref. De] [Staatliche Chem. Untersuchungsamt, Trier, Federal Republic of Germany]

Occurrence of aflatoxins in peanuts and peanut products is discussed with reference to literature and experimental data. Analysis of 637 samples of intact peanuts showed 584 to be free from aflatoxin, 17 to contain aflatoxin levels below the German tolerance, and 36 to exceed the German tolerance; the highest level recorded was 8000 μg aflatoxin B_1/kg. Only 1 of 72 packs from one supplier contained aflatoxin, vs. 10 of 13 packs from another supplier. Analysis of 733 samples of chopped peanuts showed 589 to be free from aflatoxin, 53 to have aflatoxin concn. below the tolerance limit, and 91 to exceed the tolerance. 14% had aflatoxin concn. of 200–600 μg/kg: None of 34 samples of peanut butter contained aflatoxins. Of 52 samples of 'peanut flips', 49 were aflatoxin-free, and 3 contained low aflatoxin concn. (up to 1.5 μg total aflatoxin/kg). Of 120 samples of mixed nuts, 3 contained aflatoxin, at concn. below the tolerance limit. Analysis of peanut products for aflatoxins is discussed, with special reference to the need for good homogenization of the sample. AJDW

87

Variability in corn hybrid resistance to preharvest aflatoxin contamination. [Lecture]

Lillehoj, E. B.; Zuber, M. S.

Journal of the American Oil Chemists' Society 58 (12) 970A–973A (1981) [15 ref. En] [S. Reg. Res. Cent., USDA, 1100 Robert E. Lee Boulevard, New Orleans, Louisiana 70179, USA]

A survey of the work done to date on the variability of corn hybrid resistance to preharvest aflatoxin contamination is given, under headings of: early observations of hybrid differences, aflatoxin variability in corn samples, genetically mediated resistance to aflatoxin accumulation in corn. Results (which include tables giving data on aflatoxin levels in various corn hybrids) are seen to provide a basis for further characterization of a genetic facility for resistance to the toxin-producing fungi, which has the potential for incorporation into commercial hybrids. [See FSTA (1982) 14 7B96.] LH

88

Aflatoxin in freshly harvested 1979 Georgia corn and formation after collection. [Lecture]
Shotwell, O. L.; Kwolek, W. F.; Hesseltine, C. W.
Journal of the American Oil Chemists' Society 58 (12) 980A-983A (1981) [7 ref. En] [N. Reg. Res. Cent., USDA, Peoria, Illinois 61604, USA]

Two 15-ft rows of corn were harvested in each of 57 fields in the coastal plain region of Georgia from July 24 to Sept. 28, 1979. Corn was separated randomly into 2 samples, one of which (i) was dried at 60°C to 13-14% moisture, shipped to a central location, shelled and analysed. The other (ii) was shipped to the location, shelled, dried at 80-90°C and analysed. Shipping took an average of 7 days. Samples were ground finely, blended and subsamples were assayed for aflatoxins. Results are tabulated. Toxin was detected in 37% of samples from (i) vs. 63% in (ii); violative levels (≥ 20 ng/g, by FDA guidelines) were found in 18% of (i) vs. 30% in (ii); average levels in (i) and (ii) were 36 and 78 ng/g. It is suggested that the UV detection of ≥ 1 bright greenish-yellow fluorescent particle/kg should lead to further confirmatory tests for aflatoxin. [See FSTA (1982) 14 7B96.] LH

89

Effect of genotype (open-pollinated vs. hybrid) and environment of preharvest aflatoxin contamination of maize grown in Southeastern United States. [Lecture]
Stoloff, L.; Lillehoj, F. B.
Journal of the American Oil Chemists' Society 58 (12) 976A-980A (1981) [24 ref. En] [Bureau of Foods, FDA, Washington, DC, USA]

8 open-pollinated maize genotypes (Yellow Creole, Neal Paymaster, Jarvis, Huffman, Station Mosby, Jellicorse, Dailey, Lovett) and 4 hybrids (Pioneer Brand 3147, Pioneer Brand 511A, Funk's G4864, Funk's G795W) were grown in 8 locations, mostly in the southeast USA in 1979 and 1980. Test ears were dried at 60°C for 3-5 days, analysed for insect damage (1980 crop only), and shelled. Shelled samples were ground and examined for aflatoxin contamination. Results were subjected to analysis of variance, and are given in tables. The aflatoxin detected was mainly B_1 with B_2 and G occurring occasionally. Aflatoxin incidence and level was related to location and crop yr, but not to genotype, except for 1 var. which was more susceptible to contamination. Insect damage was slightly related to aflatoxin incidence. [See FSTA (1982) 14 7B96.] LH

90

Bright greenish-yellow fluorescence and aflatoxin in recently harvested yellow corn marketed in North Carolina. [Lecture]
Dickens, J. W.; Whitaker, T. B.
Journal of the American Oil Chemists' Society 58 (12) 973A-975A (1981) [10 ref. En] [USDA, N. Carolina State Univ., Raleigh, N. Carolina 27650, USA]

Samples (approx. 4-4.5 kg) from the corn harvests of 1977 and 1978 in North Carolina were cold stored (5°C) until they were analysed for kernels giving a bright greenish-yellow fluorescence (BGYF). The wt. % of BGYF kernels in each sample was determined by hand-sorting under long wave UV light. 113 out of 250 samples taken in 1977 contained BGYF kernels, and these contained an average of 8665 ppb (parts/billion) of aflatoxin vs. 46 ppb in the remainder. In a second part of the study a linear regression analysis was performed to determine the correlation between the wt. % BGYF kernels and the ppb aflatoxin in the samples. The BGYF method was also compared to a chemical analysis method [AOAC Official First Action Method, chapter 26 in *Official Methods of Analysis of the Association of Official Analytical Chemists,* March 1975] and it was shown that both methods rejected approx. the same percentage of the lots tested, but further research is needed to compare the 2 methods under a variety of conditions. [See FSTA (1982) 14 7B96.] LH

91

Assay method for aflatoxin in milk.
Lafont, P.; Siriwardana, M. G.
Journal of Chromatography 219 (1) 162-166 (1981) [8 ref. En] [INSERM, Service de Microbiol Appliquee a Alimentation et La Nutr., 44 Chemin de Ronde, 78110 Le Vesinet, France]

Reconstituted dried milk or liquid milk previously heated at 100°C for 5 min are extracted with isopropanol, methanol, Celite and chloroform, followed by filtration through anhydrous Na_2SO_4 and evaporation. Chromatography is then performed on columns of anhydrous Na_2SO_4, Al_2O_3 a silica gel in toluene. The milk extract in toluene is eluted with chloroform/acetone (4:1). Silica gel TLC is then performed, using diethyl ether/epichlorohydrin/methanol/water (90:6:3:1) for developing the plates. Average recovery of aflatoxin M_1 added to milk (natural or reconstituted) at 20-800 ng/l in 25 tests was 98.2%. Detection limits were 5 ng/l for liquid milk and 25 ng/kg for dried milk, and repeatability was good. In tests on 11 samples of naturally-contaminated liquid milks, the proposed method gave values for aflatoxin M_1 of 15-510 ng/kg, whereas the Stubblefield method [FSTA (1980) 12 3P526] gave values of not detectable (4 samples) to 250 ng/kg. Corresponding ranges (proposed method vs. the Stubblefield method) in 14 samples of dried milks were 47-11 650 ng/kg vs. not detectable (5 samples) to 9100 ng/kg. MEG

92

[Determination of aflatoxin M_1 in milk by fluordensitometry.]
Rosa, H. V. della; Moraes, E. de C. F.
Revista de Farmacia e Bioquimica da Universidade de Sao Paulo 17 (2) 270-284 (1981) [29 ref. Pt, en] [Fac. de Ciencias Farmaceuticas da Univ. de Sao Paulo, Caixa Postal 30.786, Sao Paulo, SP, Brazil]

A sensitive method of clean-up and TLC for the estimation of aflatoxin M_1 in milk is described. It involves addition of acetone, filtration, addition of lead acetate, filtration, washing of the filtrate with hexane, extraction of the aqueous phase with chloroform, and drying and evaporation of the chloroform extract; the dried extract is redissolved in chloroform and examined by 2-dimensional TLC, using first ether/methanol/water

(94:4.5:1.5) and then chloroform/acetone/Methanol (90:10:2) as solvents, and fluordensitometry at 366 nm. For 7 samples of milk with aflatoxin M_1 added at 0.1 µg/l, mean recovery of M_1 was 89.1%, but the coeff. of variation was 33%. Aflatoxin M_1 was found, at 0.025-0.04 µg/l, in 3 of 6 samples of commercial grade B milk from Sao Paulo. JMD

93

Citrus artifact interference in aflatoxin M_1 determination in milk.
Price, R. L.; Jorgensen, K. V.; Billotte, M.
Journal of the Association of Official Analytical Chemists 64 (6) 1383–1385 (1981) [10 ref. En] [Dep. of Nutr. & Food Sci., Univ. of Arizona, Tucson, Arizona 85721, USA]

Dried citrus waste was fed to dairy cows, their milk was extracted, and aflatoxin M_1 was quantitated by using both HPLC and TLC. Results indicate that a compound from the citrus waste, which is excreted into the milk, interferes with the HPLC detn. of aflatoxin M_1 in milk and causes a false positive test. This interference can be overcome by using TLC with proper selection of developing solvents. AS

94

[Aflatoxin M_1 in dairy products.]
Tripet, F.-Y.; Riva, C.; Vogel, J.
Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 72 (4) 367–379 (1981) [16 ref. Fr, de, en] [Lab. Cantonal de Chimie, 22 Quai Ernest-Ansermet, Geneva 4, Switzerland]

A method described for measurement of aflatoxins, consists of extracting the homogenized sample with acetone/water (3:1), treating the extract with lead acetate solution to precipitate proteins and phospholipids, removing fat by treatment with hexane, and extracting aflatoxins with chloroform; the extract is dehydrated and evaporated to dryness. For simple extracts prepared from milk and butter, aflatoxin M_1 is determined by fluorodensitometry after separation by TLC on silica gel using chloroform/acetone/isopropanol (85:10:5) as developing solvent. Extracts of complex products (cheese, infant foods) are analysed by TLC in 3 directions, using diethyl ether/methanol/water (96:3:1) in the 1st direction, chloroform/acetone/isopropanol (75:15:10) in the 2nd direction (after removal of the part of the TLC plate containing impurities) and water-saturated ethyl acetate in the 3rd direction. Recovery of aflatoxin M_1, added to milk and cheese samples at 25-1500 ng/kg, was 84–90%. Detection limit was 5 ng/kg for milk and 30 ng/kg for cheese. MEG

95

Note on the effect of processing milk into khoa on aflatoxin M_1 content.
Patel, P. M.; Netke, S. P.; Gupta, B. S.; Dabadghao, A. K.
Indian Journal of Animal Sciences 51 (8) 791–792 (1981) [8 ref. En] [Coll. of Vet. Sci. & Anim. Husbandry, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh 482 001, India]

Milk obtained from buffaloes given aflatoxins contained aflatoxin m_1 at 2.7–6.0 ng/ml. Khoa produced by directly heating the milk for 3–4 h (186–225 g khoa per l milk) contained aflatoxin m_1 at 10.2–26.8 ng/g. Of the aflatoxin in milk, 83.0–98.5% was recovered in khoa, indicating that aflatoxin m_1 is resistant to severe heat treatment. BWH

96

Rapid determination of aflatoxin M_1 in dairy products by reversed-phase high-performance liquid chromatography.
Fremy, J.-M.; Boursier, B.
Journal of Chromatography 219 (1) 156–161 (1981) [8 ref. En] [Lab. Cent. d'Hygiene Alimentaire, Min. de l'Agric., 43 Rue de Dantzig, 75015, Paris, France]

In this method, samples of liquid milk, reconstituted milk or cheese are extracted with chloroform and diatomaceous earth and then injected into a Sep-Pak silica cartridge washed with hexane and diethyl ether to remove most of the lipids and pigments; aflatoxin m_1 is eluted in chloroform:methanol (9:1). A calibration curve was obtained for aflatoxin m_1 in the range 0.5–10 ng. Recoveries of aflatoxin m_1 added to dairy products at 0.001–0.005 p.p.m. were 80–120%. Identification of aflatoxin m_1 was made using reaction with trifluoroacetic acid, according to Beebe [see FSTA (1979) 11 5C285]. The complete analysis is rapid (3 h), simple and cheap, and can be applied to liquid and dried milk and whey, caseinate, and fresh and ripened cheeses. Detection limit for aflatoxin m_1 is 0.0001 p.p.m. in cheese, dried whey and dried milk and 0.05×10^{-3} p.p.m. in liquid raw milk. DMK

97

Transmission and distribution of aflatoxin in contaminated beef liver and other tissues. [Lecture]
Stubblefield, R. D.; Shotwell, O. L.; Richard, J. L.; Pier, A. C.
Journal of the American Oil Chemists' Society 58 (12) 1015A–1017A (1981) [12 ref. En] [N. Reg. Res. Cent., USDA, Peoria, Illinois 61604, USA]

A 160-kg Holstein steer was fed 52 mg B_1 equivalents/day for 5 consecutive days and then slaughtered. The liver, kidneys, spleen, heart and skeletal muscle (round) were retained and assayed for aflatoxin. The liver was cut into 14 samples and each was analysed to determine the distribution of aflatoxin in liver. Aflatoxin levels in samples from the edges of the liver were 44% lower than averages of all the remaining samples, which were 25.0 ng B_1, 15.4 ng M_1 and 47.1 ng total aflatoxin/g; however, cross-sectional samples would give representative assay results. Lower total aflatoxin concn. (16.0 ng, 18.5 ng and 12.9 ng/g) were found for heart, spleen and muscle, resp. The kidneys had the highest level of aflatoxin (145.9 ng/g) with M_1 levels (105.5 ng/g) 3.6 times the B_1 concn. (29.4 ng/g). In the other tissues, B_1 concn. were 1.6–2.9 times greater than aflatoxin M_1. [See FSTA (1982) 14 7B96] AS

98

Aflatoxin formation on whole and ground cumin and anise seeds. [Lecture]

Llewellyn, G. C.; Dixon, E. C.; Eadie, T.; Dashek, W. V.; O'Rear, C. E.
Journal of the American Oil Chemists' Society 58 (12) 985A–988A (1981) [18 ref. En] [Dep. of Biol., Virginia Commonwealth Univ., Richmond, Virginia 23284, USA]

The purpose of this study was to evaluate the potential productivity and growth of *Aspergillus parasiticus* (NRRL 2999) and the resulting toxin production on natural and autoclaved (15 lb/in^2 at 15 min) cumin and anise spice seed substrates. Both whole and ground seeds were used. Mycelia and sporulation were also noted in this 17-day experiment. Cumin and anise seeds were capable of supporting mycelial growth, sporulation and toxin production when the seeds were moist and maintained at room temp. Toxin yields were higher on ground sterile seed substrates. Of the commercial samples tested, neither the resulting cultures of natural flora nor dry whole seeds were found to contain aflatoxin or aflatoxin-like producing organisms. The anise substrates were more conducive to mycelial growth, sporulation and aflatoxin production than the cumin. Toxin levels in the various anise substrates ranged from 0.83 to 6.5 µg/g total for the 4 aflatoxins (B_1, B_2, G_1 and G_2). Cumin seed substrates usually showed only B_1 and G_1 at total levels ranging from 0.23 to 0.63 µg/g. Both spice seeds showed mycelial growth and sporulation at some time during the experimental period. Both substrates could be considered as low-level-producer substrates for aflatoxins. Anise seeds should be monitored occasionally for aflatoxin contamination when the commodities are purchased and used in large quantities. [See FSTA (1982) 14 7B96.] AS

99

Inhibition of *Aspergillus* growth and extracellular aflatoxin accumulation by sorbic acid and derivatives of fatty acids.

Chipley, J. R.; Story, L. D.; Todd, P. T.; Kabara, J. J.
Journal of Food Safety 3 (2) 109–120 (1981) [24 ref. En] [United States Tobacco Co., Res. & Development Div., Nashville, Tennessee 37202, USA]

A study was conducted to determine the effects of sorbic acid and several derivatives of fatty acids (amides, aminimides, and monoglycerides) upon toxigenic cultures of *Aspergillus flavus* and *A. parasiticus.* A synthetic medium was inoculated with spores, incubated for 48 h at 27°C, and then supplemented with sorbic acid and fatty acid derivatives. Cultures were then incubated for an additional 5 days. Aflatoxins were extracted, separated, and quantitated. Mycelial mats were dried, weighed, and analysed for lipid and mineral content. Cerulenin (8 µg/ml) was the most effective fatty acid derivative examined, reducing mycelial growth by 37% and completely inhibiting extracellular accumulation of aflatoxins. Other derivatives, in decreasing order of effectiveness, included M-20 (an aminimide), lauribic, and lauricidin. Mycelia grown in the presence of fatty acid derivatives contained less P, K, Mg, phosphatidyl ethanolamine, phosphatidyl serine, cholesterol, and triglycerides, but more cardiolipin, phosphatidyl choline, free fatty acids, fatty acid esters, and diglycerides. Levels of monoglycerides and cholesterol esters remained essentially unchanged. Inhibition by sorbic acid was nonspecific, affecting both mycelial growth and extracellular aflatoxin accumulation to approx. the same extent. Utilization of fatty acid derivatives for determining mechanisms of aflatoxin accumulation and lipid biosynthesis appears promising. AS

100

Aflatoxin and mold flora in North Carolina 1977 corn crop.

Hesseltine, C. W.; Rogers, R. F.; Shotwell, O. L.
Mycologia 73 (2) 216–228 (1981) [11 ref. En] [N. Reg. Res. Cent., USDA, SEA, Peoria, Illinois 61604, USA]

A 1977 survey of 238 corn samples from the Piedmont and Coastal Plain area of N. Carolina revealed that 187 samples contained aflatoxin, and 139 exceeded the 20 parts/billion (p.p.b.) guideline. Aflatoxin G_1 was found in 32 samples from the Piedmont area. Max. concn. of aflatoxin was 3622 p.p.b. Aflatoxin concn. increased with the % of insect-damaged corn: all samples with ≥4.5% contained the toxin, the most insect-damaged sample (11%) contained 2208 p.p.b. In general, the greater the infection by *Aspergillus flavus,* the higher the aflatoxin level. *A. niger* was found in 10.9% of the samples but was not correlated with aflatoxin concn. Strains of *Penicillinum funiculosum* were found in 25.3% of kernels examined and again were not correlated with aflatoxin concn. Few other species of *Aspergillus* or *Penicillium* were seen. Assuming most of aflatoxin G_1 to be produced by *A. parasiticus,* a definite ecological correlation was observed between G_1 and the Piedmont/mountain area. RM

101

Growth and synthesis of aflatoxin by *Aspergillus parasiticus* in the presence of sorbic acid.

Yousef, A. E.; Marth, E. H.
Journal of Food Protection 44 (10) 736–741, 745 (1981) [8 ref. En] [Dep. of Food Sci., Univ. of Wisconsin-Madison, Madison, Wisconsin 53706, USA]

2 media [basal (M_1) and enriched (M_2)] containing potassium sorbate (0–300 p.p.m. as sorbic acid) were inoculated with spores (10^4–10^6/flask) of *A. parasiticus* and incubated for 5 days at 28°C. The greater the amount of sorbate added, the higher was the pH of the media after incubation and the smaller was the yield of mould mycelium. Intermediate amounts of sorbate sometimes resulted in greater accumulation of aflatoxin than when media were free of sorbate. Sorbate more effectively inhibited mould growth and aflatoxin production in medium M_2 than M_1 and when the small rather than the large inoculum was used. A second trial was done with 10^6 or 10^5 spores/ flask of M_2 (approx. 27 ml) and 10^5 spores/flask of M_2 (approx. 27 ml) containing sorbate (200 p.p.m. of sorbic acid). Cumulative data for mould growth, pH and content of aflatoxin in the medium showed that relative effects of different treatments changed during the incubation period. An index to measure the capacity of moulds to synthesize aflatoxins was developed. Application of the

index indicates that sorbate delayed mould growth but did not inhibit biosynthesis of aflatoxin. The ability to synthesize aflatoxin was greatest in the early stages of mould growth and then decreased linearly as mould growth progressed. AS

102

A composite medium for the standardized measurement of aflatoxin accumulating capacity of in-vitro culture system.
Arseculeratne, S. N.; Weliange, L. V.
Journal of the National Science Council of Sri Lanka 8 (1) 41-51 (1980) [8 ref. En] [Univ., Peradeniya, Sri Lanka]

Conventional methods using single incubation periods for the study of aflatoxin production in solid substrates have the disadvantage of not taking into account significant variations of toxin contents with time. A single-step method using a double-layered composite medium is described for detn. of the max. quantity of aflatoxin accumulated in experimental culture. The method is based on the capacity of silica gel to adsorb aflatoxin and remove it from degradative mechanisms which operate in the substrate and are probably responsible for the phasic variations of toxin content which occur in the adsorbent-free medium. This method permits standardization in terms of adsorbent, substrate, inoculum, incubation conditions and extraction procedure. (Substrates tested included grated coconut, cow peas, green gram, and peanuts. Pulses and grains were pulverized to sieve size BS22 or 44, oilseeds minced and used as particles of mesh size BS 10). AS

103

[Occurrence of aflatoxin-forming moulds in foods.] Zum Vorkommen Aflatoxin-bildender Schimmelpilze in Lebensmitteln.
Kuhn, G.
Nahrung 26 (1) 31-35 (1982) [6 ref. De, en, ru] [Bezirks-Hygiene-Inspektion & -Inst., Berlin]

Approx. 900 samples of various foods were tested for aflatoxin-forming moulds by the screening test of De Vogel et al. [*Journal of Applied Bacteriology* (1965) 28, 213], and contents of aflatoxin B_1 were determined. Peanuts, Brazil nuts, walnuts and marzipan mass were especially highly contaminated with moulds; these products also had high aflatoxin concn. (<400 µg/kg for Brazil nuts). Cereals and cereal products also had high mould counts (including toxigenic *Aspergillus flavus* strains) but did not contain detectable levels of aflatoxin. Mould-containing fruit, vegetable, cocoa, meat, sausage, dairy, egg and ice cream samples were also free from aflatoxin. IN

104

Estimation of the distribution of lots of shelled peanuts according to aflatoxin concentrations.
Whitaker, T. B.; Dickens, J. W.
Peanut Science 6 (2) 124-126 (1979) [6 ref. En] [USDA, SEA-AR, & Dep. of Biol. & Agric. Eng., N. Carolina State Univ., Raleigh, N. Carolina, 27650, USA]

Distribution of shelled peanut lots according to their true aflatoxin concn. is different from distribution of aflatoxin assays made on those lots. This difference is due to assay errors associated with sampling, subsampling and analysis. A method was developed to estimate distribution of lots according to their true aflatoxin concn. based on aflatoxin assays. Estimates of the distribution of the 1973, 1974, and 1975 peanut lots were computed from their aflatoxin assays which were recorded by the Peanut Administrative Committee (PAC). 55% of the PAC assays for the 3 crop yr were <3 parts/billion (p.p.b.) aflatoxin, whereas the estimated lot distribution indicated that only 48% of the lots were <3 p.p.b. On the other hand, only 94% of the assays compared to an estimated 96% of the lots were <25 p.p.b. AS

105

[Aflatoxin content of almonds and almond products, and apricot and peach kernels.] Zum Aflatoxingehalt von Mandeln und Mandelerzeugnissen, Aprikosen- und Pfirsichkernen.
Woller, R.; Majerus, P.
Lebensmittelchemie und Gerichtliche Chemie 36 (1) 8-10 (1982) [17 ref. De] [Chem. Untersuchungsamt Trier, Maximineracht 11a, D-5500 Trier, Federal Republic of Germany]

Analysis of 198 samples of whole almonds showed 191 (96.5%) to be free from aflatoxins, 6 (3.0%) to contain aflatoxins at a level lower than the tolerance (10 kg aflatoxin B_1/kg) and 1 to contain 12 µg aflatoxin B_1/kg. Analysis of 140 chopped almond samples showed 91 to be aflatoxin-free, 29 to contain aflatoxin at levels lower than the tolerance, and 20 to contain aflatoxin at levels higher than the tolerance (aflatoxin B_1 concn. of 17-208 µg/kg). Of 284 samples of ground almonds, 189 were aflatoxin-free, 50 contained aflatoxin at levels below the tolerance, and 45 contained aflatoxin at higher levels (11-189 µg aflatoxin B_1/kg). None of 6 samples of apricot kernels contained aflatoxin. Only 1 of 17 marzipan samples contained aflatoxin B_1, at 3.6 µg/kg. Comparison with literature data suggests that incidence of contamination of almonds and almond products with aflatoxins is decreasing. AJDW

106

Distribution of aflatoxin in whole peanut kernels, sampling plans for small samples.
Knutti, R.; Schlatter, C.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 174 (2) 122-128 (1982) [11 ref. En, de] [Inst. für Toxikologie der ETH, Zurich, Switzerland]

To assist establishment of sampling plans for detn. of aflatoxin contamination of peanuts, the validity of mathematical models describing distribution of aflatoxin among whole peanut kernels was studied. The 1st model studied was a discrete negative binomial distribution, in which kernels with very low concn. of aflatoxin are the most abundant, frequency of occurrence falling off with increasing aflatoxin concn. The 2nd model was a compound poisson-gamma distribution in which contaminated kernels are poisson-distributed among the uncontaminated ones, and the aflatoxin contents of the contaminated kernels are gamma-distributed. To determine which model most accurately predicted aflatoxin contamination of 1 lot of shelled unroasted kernels, bulk samples of 10 000, and

1000, kernels and smaller samples of 10 and 1 kernels were analysed, and parameters of variation were estimated from mean concn. of sample. Estimation from single kernel samples was impractical. The negative binomial distribution fitted the data best. The variability parameter *k* can be calculated from the results and used to construct 'operation characteristic' curves that show the probability of wrongly accepting a lot at a certain reject level of contamination for a given sample size. Examples are given for reject levels of 1 and 5 ng/g; e.g. for a lot with a true mean concn. of 2 ng/g the probabilities of acceptance are 54% and 88% resp. for reject levels of 1 and 5 ng aflatoxin/g. To protect the interests of consumers and producers, large samples must be analysed. DIH

107

[Aflatoxins and *Aspergillus flavus* content in maize stored in commercial silos.]
Sanchis Almenar, V.; Samo Lumbreras, A.; Hernandez Haba, J.; Hernandez Gimenez, E.
Revista de Agroquimica y Tecnologia de Alimentos 20 (3) 371–380 (1980) [25 ref. Es, en] [Escuela Tecnica Superior de Ingenieros Agron., Valencia, Spain]

31 samples of corn from Argentina and the USA, stored in 7 bins, were examined for fungi and aflatoxins. The relation between *Asp. flavus* infection and presence of aflatoxins was also studied. Tabulated results showed a high rate of aflatoxin contamination: 90% of samples (29 samples) contained 15– >100 µg aflatoxin/kg. 89% of samples from Argentina and 82.3% from the USA contained >20 µg/kg. There was a direct relation between the level of *Asp. flavus* infection and the quantity of toxin detected. The high levels of infection by toxigenic fungi represent a potential health hazard in the use of the corn. [From En summ.] RM

108

A prospective analysis of the potential risk associated with inhalation of aflatoxin-contaminated grain dusts. [Review]
Baxter, C. S.; Wey, H. E.; Burg, W. R.
Food and Cosmetics Toxicology 19 (6) 765–769 (1981) [43 ref. En] [Dep. of Environmental Health, Univ. of Cincinnati, Cincinnati, Ohio 45267, USA]

In the USA aflatoxin contamination of certain agricultural crops such as peanuts, corn and cottonseed continues to pose a problem, especially in the south-eastern states where climatic conditions are conductive to fungal growth. Analysis of airborne dust samples generated from contaminated corn in an agricultural setting has revealed the presence of respirable particles containing aflatoxins. Since aflatoxins are among the most potent of carcinogens, exposure by any route poses a potential hazard. Unfortunately, an adequate assessment of the health hazard resulting from inhalation exposure to aflatoxin-contaminated grain dust is currently impossible, due to the almost total lack of data regarding this route of exposure. However, a prospective analysis of the potential risk has been performed using information concerning: the absorption and carcinogenic effects of another potent carcinogen, benzo[α]pyrene, when adsorbed onto respirable particles; the metabolic capability of cultured human bronchus towards aflatoxins; the irritant nature of respired organic dusts; and potential modifying factors known to influence carcinogenic outcome. Suggestions are made regarding the types of information that are still needed in order to adequately assess the risk associated with inhalation of aflatoxin-contaminated grain dust. AS

109

Colonisation and aflatoxin formation by *Aspergillus* spp. on brown rices differing in endosperm properties.
Ilag, L. L.; Juliano, B. O.
Journal of the Science of Food and Agriculture 33 (1) 97–102 (1982) [22 ref. En] [Dep. of Plant Path., Univ. of the Philippines, Los Banos, Philippines]

Aspergillus flavus Link and *A. parasiticus* Speare differed in sporulation and aflatoxin B_1 formation on 15 brown rices differing in starch properties and protein content. There was no significant correlation between the degree of spore formation by the fungi and the amount of aflatoxin they produced in the rice samples. Differences in sporulation and aflatoxin production were not correlated with the dimensions (weight and hardness) of brown rice nor with the protein content, alkali spreading value, amylose content and gel viscosity of milled rice. Aflatoxin B_1 was mainly concentrated in the bran layers. Histological examination revealed that the hyphae of *A. flavus* entered through cracks in the periderm and penetrated the endosperm. AS

110

Public health significance of milk borne intoxications. II. *E. coli, B. cereus, Streptococcus* and *Aspergillus*.
Batish, V. K.; Garg, S. K.; Harish Chander; Ranganathan, B.
Indian Dairyman 33 (8) 501–503 (1981) [4 ref. En] [Dairy Bact. Div., Nat. Dairy Res. Inst., Karnal-132 001, India]

Nature and biological activity of toxins produced by *Escherichia coli, Bacillus cereus, Streptococcus* and *Aspergillus* spp. in milk and milk products are reviewed, and preventive measures are outlined. CFTRI

111

[Contamination of milk and milk products with aflatoxin M_1.]
Tripet, F. Y.; Riva, C.; Vogel, J.
Lait 61 (609/610) 634–637 (1981) [9 ref. Fr, en] [Lab. Cantonal de Chimie, Geneva, Switzerland]

In Switzerland, the use of groundnut meal in feedstuffs for dairy cows has been prohibited since 1978. Max. permitted contents of aflatoxin M_1 are 250 ng/kg in cheese, 50 ng/kg in milk and 10 ng/kg in infant foods. Methods used in control laboratories in Switzerland for detecting aflatoxins in milk products are outlined briefly. In the Geneva canton, where milk comes from both French and Swiss farms, 163 samples of milk were examined for aflatoxin M_1 content during the winter of 1978/79, and 14 (8.6%) were found to contain >50 ng/kg; 1 sample contained 2000 ng/kg. Similar tests in 1979/80 on 230 samples showed that 17.8% had excessive aflatoxin M_1 contents, with 1 sample containing 3000 ng/kg. After appropriate measures were taken, there were few cases of high aflatoxin contents in milk samples examined in the winter of 1980/81. Analysis of imported French cheeses in 1979/80 showed that 37% had aflatoxin M_1 contents of >500 ng/kg. Use of feedstuffs containing groundnut meal is thought to be the cause of the contamination. MEG

112

Aflatoxins B_1 and M_1: tissue residues and feed withdrawal profiles in young growing pigs.
Neff, G. L.; Edds, G. T.
Food and Cosmetics Toxicology 19 (6) 739–742 (1981) [14 ref. En] [Dep. of Preventive Med., Coll. of Vet. Med., Univ. of Florida, Gainesville, Florida 32610, USA]

Investigations were carried out in order to establish a necessary withdrawal period before slaughter for animals maintained on aflatoxin-contaminated diets. Distribution and clearance profiles of aflatoxin B_1 (AFB_1) and its metabolite aflatoxin M_1 (AFM_1) were investigated in young growing pigs given AFB_1 (levels of 34, 341, 866 and 1253 ng/g diet) orally for 3 wk and then killed after varying withdrawal periods (0, 1, 2 and 4 days). Highest concn. of toxin were found in the kidney, as the AFM_1 metabolite. At zero withdrawal time, AFB_1 and AFM_1 were present in the liver and kidney of the groups fed 866 or 1253 ng/g. 1 of the pigs fed the 1253 ng/g diet retained AFM_1 residues in the kidney 2 days after withdrawal of the test diet. No AFB_1 residues were detected in any tissues 1 day after withdrawal. No residues were detected in any tissues 4 days after withdrawal or in the muscle tissues examined at any time. VJG

113

The anti-aflatoxigenic effects of some condiments on aflatoxin formation.
Mabrouk, S. S.; El-Shayeb, N. M. A.
Annali di Microbiologia ed Enzimologia 29, 61–66 (1979) [26 ref. En, it] [Lab. of Natural Products, Nat. Res. Cent., Dokki, Cairo, Egypt]

Studies were conducted on effects of 3 spices, (i) cardamom, (ii) capsicum and (iii) fennel on growth of aflatoxin formation by *Aspergillus flavus* strains M 93 and 182. The moulds were cultured on rice powder/corn steep liquor medium (containing (i), (ii) or (iii) at 0.5, 5 or 10 g/100 ml) at 25°C for 6 days. Data are presented for mycelium wt., aflatoxin concn. in the mycelium and in the culture filtrate, and aflatoxin concn. as % of those in the control. Mycelial growth was stimulated by the spices at concn. of 5 or 10%; lower spice concn. had little effect on mycelial growth. All 3 spices considerably reduced aflatoxin formation, the reduction increasing with increasing spice concn. Aflatoxin levels (as % of those for control samples) for *A. flavus* strain 182 grown on media with 10% spice were: (i) 5.0; (ii) 6.1 and (iii) 13.3. Corresponding values for *A. flavus* strain M 93 were (i) 8.6, (ii) 10.5 and (iii) 42.7. Aflatoxin concn. in the mycelium were higher than those in the culture filtrate. AJDW

114

Production of blue-fluorescent pyrazines by *A. parasiticus*.
Buchanan, R. L.; Houston, W. M.
Journal of Food Science 47 (3) 779–782 (1982) [En] [Dep. of Nutr. & Food Sci., Drexel Univ., Philadelphia, Pennsylvania 19104, USA]

Aspergillus parasiticus NRRL 2999 did not produce aflatoxins on peptone-mineral salts medium, but did accumulate blue-fluorescent material having R_f on TLC plates similar to aflatoxins B_1 and B_2. The blue-fluorescent material was ultimately resolved into 9 compounds. The 4 major compounds were tentatively identified by MS as deoxyaspergillic acid, flavocol, deoxydehydroxymutaaspergillic acid, and 2-hydroxy-3,6-di-sec-butylpyrazine, blue-fluorescent pyrazines that have previously been isolated from other aspergilli. Evaluation of AOAC-recommended solvent systems for aflatoxin analyses indicated that diethyl ether/methanol/water (98:1:1) was the best TLC solvent system for separating aflatoxins from interfering fluorescent material. Pyrazine production was inversely related to carbohydrate content of the medium. Care should be taken in evaluating aflatoxin analyses of material with high protein and low carbohydrate levels. IFT

115

[Results of two collaborative studies to determine aflatoxins B and G.] Ergebnisse von zwei Ringversuchen zur Bestimmung der Aflatoxine B und G.
Kellert, M.; Spott, H.-J.
Bundesgesundheitsblatt 23 (1/2) 13–21 (1980) [5 ref. De, en] [Max von Pettenkofer-Inst. des Bundesgesundheitsamtes, Abteilung Lebensmittelchemie, Postfach, 1000 Berlin 33]

2 collaborative studies of aflatoxin detn. in corn mea and peanuts were carried out. In the 1st study the method recommended by the Federal Health Office (BGA) was used by 23 laboratories for detn. of aflatoxins B_1, B_2, G_1 and G_2 in standard solutions (approx. 1 µg/ml of each toxin) and spiked cornmeal (containing 10–200 µg total aflatoxin/kg). Collaborators' results for the standard solutions differe from the standard by up to 50%, results for aflatoxins B_2 and G_2 being worst. Recovery of total aflatoxin from spiked corn meal was 66.2% (coeff. of variation 26.0%) when the BGA method was used exactly as recommended. In a 2nd study a method developed by the authors (and described in full) was studied. Aflatoxins are extracted in chloroform/water, purified by column chromatography, separated by 2-dimensional TLC and quantitated by fluorescence measurement. Positive identification is from use of different solvent systems and on-plate derivatization.

Recovery of total aflatoxin from spiked corn meal (27 collaborators, 40–200 μg/kg) was 94.2%, coeff. of variation 9.4%. Superior extraction of aflatoxin is claimed for the 2nd method. Results for detn. of aflatoxins B_1, B_2 and G_1 in spiked corn meal and peanut samples are also tabulated. DIH

116

Comparison of rapid high pressure liquid chromatographic and CB methods for determination of aflatoxins in corn and peanuts.
DeVries, J. W.; Chang, H. L.
Journal of the Association of Official Analytical Chemists 65 (2) 206–209 (1982) [10 ref. En] [Medallion Lab., General Mills Inc., 9000 Plymouth Avenue N, Minneapolis, Minnesota 55427, USA]

A rapid HPLC method for detn. of aflatoxins was compared with the more time-consuming CB method (AOAC method 26.026). In the rapid method, homogenized samples are extracted with dichloromethane, and after evaporation of the solvent, dissolution in acetonitrile and washing the acetonitrile solution with light petroleum followed by evaporation of the acetonitrile, samples are derivatized with trifluoroacetic acid and dissolved in acetonitrile/water/acetic acid for injection onto a reversed-phase HPLC C18 radial compression column. Elution solvent is acetonitrile/water/glacial acetic acid (18 + 82 + 1 by vol.). Detection is by fluorescence at 440 nm with excitation at 365 nm. 7 corn samples were analysed by the CB method and the HPLC method, which gave mean total aflatoxin concn. of 140.83 and 160.96 μg/kg, resp.; if 1 heavily contaminated sample is eliminated respective means are 98.16 and 100.73 μg/kg. 14 peanut butter and peanut meal samples were analysed by CB and HPLC methods; respective mean total aflatoxin concn. were 22.16 and 22.52 μg/kg. Sample-by-sample comparison of methods for all samples (peanut and corn) shows a correlation coeff. of 0.991 and no significant difference between the methods by Student's t-test, 15.74% α-risk. If the 1 corn sample mentioned is eliminated, corresponding values are 0.999 and no significant difference at 2.8% α-risk. DIH

117

Modification by beet and cabbage diets of aflatoxin B_1-induced rat plasma α-foetoprotein elevation, hepatic tumorigenesis and mutagenicity of urine.
Boyde, J. N.; Babish, J. G.; Stoewsand, G. S.
Food and Chemical Toxicology 20 (1) 47–52 (1982) [26 ref. En] [Inst. of Food Sci., Cornell Univ., Geneva, New York 14456, USA]

This study was undertaken to investigate the effect of 2 vegetables, one cruciferous and one non-cruciferous, on hepatic tumour development induced in rats by aflatoxin B_1. Rats were fed a diet or diets containing 25% (w/w) freeze-dried ground beets or cabbage with or without 1 p.p.m. AFB_1 for 26 wk. The beet- and cabbage-containing diets had no effect on the plasma AFP concn., hepatic tumorigenesis, or the mutagenicity or urine in rats receiving no AFB_1. The results of these experiments demonstrate that dietary cabbage acts as a 'negative modifier', and dietary beets act as a 'positive modifier' of AFB_1-induced hepatic tumorigenesis in rats and that plasma AFP and urinary mutagenesis determinations can be useful in the rapid identification of dietary factors that modify chemical carcinogenesis. VJG

118

Mycotoxins and the cereals industry – a review.
[Review]
Osborne, B. G.
Journal of Food Technology 17 (1) 1–9 (1982) [36 ref. En] [Flour Milling & Baking Res. Assoc., Chorleywood, Herts, WD3 5SH, UK]

Mycotoxins which have been detected in cereals are aflatoxins, zearalenone, ochratoxin A, nivalenol, deoxynivalenol, T-2 toxin and diacetoxyscirpenol and of these only aflatoxin B_1 has so far been shown to exhibit serious toxicity to humans. Surveys have shown that the occurrence of mycotoxins in cereals in the UK and USA is rare except for localized problems with corn in the Southern USA. Also it is clear that aflatoxins are more likely to occur in warm humid climates while the other mycotoxins listed above are more characteristic of temperate climates if there is a wet harvest. AS

119

Aflatoxin distribution and total microbial counts in an edible oil extracting plant. I. Preliminary observations.
Abalaka, J. A.; Elegbede, J. A.
Food and Chemical Toxicology 20 (1) 43–46 (1982) [19 ref. En] [Dep. of Biochem., Ahmadu Bello Univ., Zaria, Nigeria]

Samples of groundnut kernels (derived from government supply and stored in the factory premises, and others obtained from miscellaneous sources and used for processing just as they came into the premises), groundnut and cottonseed pellets, and groundnut and cottonseed oils (crude and refined) were supplied by a local oil-extracting plant. They were screened for aflatoxins B_1, B_2, G_1 and G_2, and groundnut kernels and groundnut and cottonseed pellets were additionally examined for total microbial counts. All samples contained aflatoxins (B_1, B_2, G_1 and G_2). In contrast to the relative levels of aflatoxins, the microbial counts were higher in the government controlled source than in those from miscellaneous sources. The high level of aflatoxin detected in this investigation appears to suggest either a poor method of storage or a lack of thorough screening at the buying stage, or possibly both. The study also identified in substantial numbers several types of microorganisms that have been associated with industrial and health hazards. VJG

120

[Aflatoxin M_1 in raw milk.]
Bartos, J.; Matyas, Z.
Veterinarni Medicina 26 (7) 419–423 (1981) [25 ref. Cs, ru, en, de] [Vyzkumny Ustav Vet. Lekarstvi, 621 32 Brno, Czechoslovakia]

34 samples of raw milk from 26 farms in southern Moravia and 43 bulk samples from tankers were examined during the period Jan.-July, 1980. Aflatoxin M_1 was detected in 5 of the farm milk samples at trace-0.38 µg/l; no aflatoxin M_1 was detected in any of the bulk milk samples. SKK

121

[Recent developments in milk production and occurrence of pathogens in milk and dairy products.]
Neuzeitliche Entwicklungen im Bereich der Milchwirtschaft und das Vorkommen von Erregern in Milch und Milchprodukten. [Review]
Lang, K.
Öffentliche Gesundheitswesen 40 (3) 131–139 (1978) [38 ref. De, en] [Justus Liebig Univ., Giessen, Federal Republic of Germany]

After reviewing the potential of milk and milk products as a carrier of pathogenic microorganisms and a source of human infection, the author outlines measures taken in the Federal Republic of Germany since the 2nd World War in the form of legislation to prevent such contamination. Possible dangers of post-processing contamination of milk and milk products with pathogens and the possible occurrence of mycotoxins in pasteurized milk and cheese is also discussed. EJM

122

Note on the survey of consumer milk supplied to Jabalpur city for the incidence of aflatoxin M_1 and M_2.
Patel, P. M.; Netke, S. P.; Gupta, B. S.; Debadghao, A. K.
Indian Journal of Animal Sciences 51 (9) 906 (1981) [9 ref. En] [Coll. of Vet. Sci., Jawaharlal Nehru Krishi Vishwa Vidyalaya, Mhow, Madhya Pradesh 453 446, India]

Of 71 samples of fresh liquid milk from retail outlets, 3 were positive for aflatoxin M_1 with 0.71, 2.71 and 3.37 µg/l. None of the samples contained aflatoxin M_2. BWH

123

[Mycotoxins in mould-ripened cheese: a review.]
Mykotoxine in schimmelgereiften Käsen – eine Literaturübersicht. [Review]
Schoch, U.
Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 72 (4) 380–395 (1981) [61 ref. De, en, fr] [Inst. für Toxikologie der ETH, Zurich, Switzerland]

An outline is given of the types of moulds used for cheesemaking (e.g. *Penicillium roqueforti* and *P. camemberti*), and the biosynthesis of mycotoxins (cyclopiazonic acid, PR-toxin, roquefortine, mycophenolic acid, isofumigaclavins A & B and penicillic acid) by *Penicillium* spp. is discussed. Factors influencing the formation of mycotoxins, biological properties of mycotoxins and their occurrence in cheese are also discussed. MEG

124

Studies on aflatoxicosis in swine: morphological effects, clinicopathological alterations, and tissue residues.
Miller, D. M.
Dissertation Abstracts International, B 42 (5) 1778: Order no. 8123080, 110pp. (1981) [En] [Univ. of Georgia, Athens, Georgia 30601, USA]

In the first experiment, morphological changes occurring in the livers of 30 pigs fed diets containing 0.0, 0.4 or 0.8 µg aflatoxin/g were compared to changes in haematology, serum enzymes, serum proteins and the cellular immune system. In the second experiment, serum enzyme, histological and ultrastructural alterations were examined in young male pigs given a single oral dose of 1.2 mg aflatoxin B_1, B_2, G_1 and G_2/kg body wt. In the third experiment, the livers, kidneys and muscles of the pigs used in the first 2 experiments were analysed by HPLC for residues of aflatoxin B_1, B_2, G_1, G_2 and M_1. It is concluded from the results of the third study that aflatoxin residues in muscles decreased to below the detection limit 72 h after dosing with aflatoxin; similar decreases were noted in the livers and kidneys. JA

125

Withdrawal time required for clearance of aflatoxins from pig tissues.
Furtado, R. M.; Pearson, A. M.; Hogberg, M. G.; Miller, E. R.; Gray, J. I.; Aust, S. D.
Journal of Agricultural and Food Chemistry 30 (1) 101–106 (1982) [31 ref. En] [Dep. of Food Sci. & Human Nutr., Michigan State Univ., E. Lansing, Michigan 48824, USA]

The time necessary to obtain clearance of aflatoxins from pig tissues after removal from a contaminated diet was determined in 2 trials involving 20 pigs in each. There was a significant reduction in aflatoxin levels in all organs and tissues 1 day after placing the pigs on an aflatoxin-free ration. After 2 days, only 1 pig contained trace amounts (<0.50 µg/kg) of aflatoxins in the tissues. 4 days after removal from the contaminated diet, there were no detectable levels of aflatoxins in any of the tissues. A naturally contaminated diet containing only 20 and 31 µg/kg aflatoxins B_1 and B_2, resp., resulted in traces of aflatoxins B_1, B_2, M_2, and M_2 in the livers and kidneys after 13–14 h withdrawal from the contaminated diet, although none were detected in any other tissues. AS

126

[Modification of aflatoxin B_1 in alkaline pH solutions.]
Itoh, Y.; Morishita, Y.; Aibara, K.
Journal of the Agricultural Chemical Society of Japan [Nihon Nogei Kagakkai-shi] 54 (7) 527–534 (1980) [15 ref. Ja, en] [Dep. of Biomedical Res. on Foods, Nat. Inst. of Health, Shinagawa-ku, Tokyo 141, Japan]

Aflatoxin B_1 (AFB_1) was dissolved in buffer solutions of different pH values (3.0, 5.0, 7.0, 9.0 and 11.0), and the mixture was incubated at 37°C for 0, 24, 48 and 72 h. The resulting products, before and after extraction with chloroform, were characterized by TLC and also by fluorescence analysis under UV light: Sample I represents the products before extraction; Sample II, the chloroform extract; and Sample III, the aqueous residue. At pH 5.0 and 7.0, >90% of AFB$_1$ was recovered in Samples I and II, regardless of the incubation period. After exposure to pH 9.0 for 24 h, the recovery of AFB$_1$ in Sample II was about 20%, while it was 0% at pH 11.0. At either pH no appreciable fluorescence was observed in Samples I and III, which upon TLC yielded an ellipsoidal spot. Though the spot was not well demarcated, it had the same Rf value and fluorescence as AFB$_1$. This spot increased in proportion to the decrease in AFB$_1$ recovery in Sample II. The material in the spot was called AFB$_1$-like substance. Further studies demonstrated that when AFB$_1$ was kept at pH 11.0 for 1 h, it was converted to the AFB$_1$-like substance, which yielded the same Rf values as AFB$_1$ when developed with 8 different solvents but unlike AFB$_1$, did not react with *p*-anisaldehyde nor with 0.5% Fast Blue Salt B. AS

127

Influence of gamma irradiation on aflatoxin B$_1$ production by *Aspergillus flavus* growing on some Nigerian foodstuffs.
Ogbadu, G.
Microbios 27 (107) 19–26 (1980) [21 ref. En] [Dep. of Biochem., Ahmadu Bello Univ., Zaria, Nigeria]

Spores of *Aspergillus flavus* (UI, 81) inoculated into some local food materials were irradiated at 62.5, 125.0, 250.0 and 500.0 krad, and the effect on aflatoxin B$_1$ production on subsequent incubation was measured. The results show that aflatoxin B$_1$ production decreased with increasing gamma irradiation dose in soybean, groundnut and palm juice, while paw paw mash showed a relatively high yield of aflatoxin at 125.0 krad as compared to other irradiation levels tested, except for the control. Irradiation of soybean and groundnut, inoculated with spores of *Aspergillus flavus* at 500.0 krad (pre-irradiation incubation period of 2 h) inhibited aflatoxin B$_1$ production. Analysis of variance showed that media, pre-irradiation incubation periods and irradiation levels affected total amounts of aflatoxin produced. AS

128

[Recent developments of mycotoxin-monitoring system.] [Review]
Ueno, Y.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] 21 (5) 339–343 (1980) [20 ref. Ja] [Fac. of Pharmacy, Tokyo Univ. Sci., Ichigaya Funagawara-machi, Shinjuku-ku, Tokyo, Japan]

The monitoring systems for mycotoxins mutagenetic to *Salmonella typhimurium*, metabolic products such as aflatoxin B$_1$, and radioimmunoassay for mycotoxins in trace quantities were reviewed. Fluorescence analysis, supply of standard mycotoxin and related problems are discussed. TM

129

Mycotoxin teratogenicity and mutagenicity. [Book]
Hayes, A. W.
121pp. ISBN 0-8493-5651-2 (1981) [673 ref. En] [Boca Raton, Florida, USA; CRC Press, Inc. [Rohm & Haas Co., Spring House, Pennsylvania, USA]

This book brings together the available published data on mycotoxins and their potential mutagenicity and teratogenicity in animals and in man. The format of the text is in 4 parts. The first chapter (pp. 1–10) is a general introduction which deals with the overall problem of mutagenicity and teratogenicity to the human population. The second chapter (pp. 11–40) presents the available evidence suggesting the involvement of mycotoxins in human diseases (ergotism, cardiac beriberi, alimentary toxic aleukia, stachybotryotoxicosis, drunken bread, dendrodotoxicum, aflatoxin diseases, balkan nephropathy, kashin-beck, onyalai) and the use of experimental animals to test for carcinogenicity, teratogenicity, target organ injury, and cellular toxicity. The third chapter (pp. 41–66) deals with mycotoxins (including aflatoxins Aspergillus mycotoxins, Penicillium mycotoxins, mycotoxins of both Penicillium and Aspergillus spp., Alternaria toxins, cytochalasins, ergot alkaloids, Stachybotrys toxins, Fusarium toxins, Streptozotocin) and abnormal foetal development. The fourth chapter (pp. 67–90) considers mycotoxins as mutagens. A bibliography of 673 references is appended. VJG

130

Mycotoxins in food.
Martin, C. R. A.
British Food Journal 83 (903) 102–103, 116 (1981) [6 ref. En]

The range of mycotoxicoses associated with food is surveyed, including ergotism, and toxins from *Aspergillus, Penicillium, Fusarium,* and other genera. In general, it is concluded, no real hazard to human health is posed by mycotoxins, and toxic symptoms are only found when mouldy foods are eaten in high doses for prolonged periods; however, the modern recovery technologies and the increasing use of novel sources of human food pose new problems, and contamination with mycotoxins should always be considered. JRR

131

[Biosynthesis of mycotoxins by the *Aspergillus* and *Penicillium* fungi isolated from grain.]
L'vova, L. S.; Shul'gina, A. P.; Shatilova, T. I.; Kizlenko, O. I.
Prikladnaya Biokhimiya i Mikrobiologiya 14 (5) 735–741 (1978) [23 ref. Ru, en] [Vses. Nauchno-issled. Inst. Zerna i Produktov ego Pererabotki, Moscow, USSR]

132

[Contamination of Nicaraguan sorghum (*Sorghum vulgare*) with mycotoxins.]
Arroliga, R.; Altamirano, R. M. de; Gonzalez, F.; Pertz, G.
Boletin Tecnico LABAL 3 (1) 26–32 (1982) [8 ref. Es, en] [Lab. de Tecnologia de Alimentos, Min. de Ind., Managua, Nicaragua]

A total of 61 samples of sorghum from 42 silos from 12 locations in Nicaragua were analysed for aflatoxins by a microcolumn/Velasco Fluorotoxin meter method, results being confirmed by TLC. Only 4 samples had aflatoxin concn. of 0–20 parts/billion (p.p.b.); 34 had concn. >50 p.p.b. No relation of storage time to aflatoxin concn. was observed. AJDW

133

Contamination of dairy products and cattle feed concentrates on the local market with aflatoxin.
Marshaly, R. I.; El-Deeb, S. A.; Ismail, A. A.; Youssef, A.
Egyptian Journal of Dairy Science 9 (2) 181–191 (1981) [34 ref. En, ar] [Dep. of Dairy Sci., Alexandria Univ., Alexandria, Egypt]

Aflatoxin M content of milk samples from cows and buffaloes on 10 farms, mainly in the Alexandria area, ranged from 2.08 to 5.82, and 2.04 to 7.22 μg/kg resp. Numerous samples of local and imported milk and dairy products were tested for aflatoxin M contamination; aflatoxin M was found in 3 of 5 local yoghurt samples (5.92–7.35 μg/kg), all of 4 local El-Ras cheese samples (5.7–9.2 μg/kg), and 2 of 5 local dried milk samples (3.1 and 5.2 μg/kg). CDP

134

[Determination of aflatoxin content in milk.]
Mochalov, V. I.; Semenova, L. N.; Eremina, L. A.
Molochnaya Promyshlennost' No. 11, 13–14 (1981) [7 ref. Ru] [Vses. Nauchno-issled. Inst. Molochnoi Promyshlennosti, Moscow, USSR]

For detn. of aflatoxin B_1 in milk, a sample is separated by centrifugation. 25 ml of the skim milk are shaken in a separating funnel with 1–2 g NaCl, 100 ml acetone are added, followed after shaking for 1–2 min by 100 ml chloroform, the mixture is shaken as before, allowed to stand for 5 min, the bottom layer is filtered and dried in a rotary evaporator. The residue is dissolved in 4 ml chloroform, and a portion is examined by TLC, a series of aflatoxin B_1 standards being applied simultaneously for comparison; either benzene/chloroform/acetone (45:40:15) or toluene/ethyl acetate/formic acid (5:4:1) are used for resolution. Aflatoxin B_1 R_f was 0.32 and 0.43 resp. in these solvents; the spots are visualized in UV light. The method enables detection of 4 μg aflatoxin B_1 in 1 l milk in 35–40 min. SKK

135

Occurrence of aflatoxins in oilseeds providing cocoa-butter substitutes.
Kershaw, S. J.
Applied and Environmental Microbiology 43 (5) 1210–1212 (1982) [9 ref. En] [Huson & Hardwick, Liverpool L3 6AA, UK]

4 oilseeds providing cocoa-butter substitutes, i.e. shea, pentadecima, illipe and salseed, when tested as substrates for aflatoxin production by 2 strains of *Aspergillus parasiticus*, gave varying levels of aflatoxin. Aflatoxins were found at low levels occurring naturally in mouldy shea nuts, but none of 21 commercial shea nut samples contained <20 μg aflatoxin B_1/kg. AS

136

[The mycotoxin and especially the aflatoxin situation in beer, raw materials and by-products of brewing.]
Zur Mykotoxin- und insbesondere zur Aflatoxinsituation bei Bier, Ausgangsstoffen und Nebenprodukten der Bierbereitung.
Woller, R.; Majerus, P.
Brauwissenschaft 35 (4) 88–90 (1982) [12 ref. De, en, fr] [Staatliches Chem. Untersuchungsamt Trier, Maximineracht 110, D-5000 Trier, Federal Republic of Germany]

Literature data on occurrence of mycotoxins in beer and in brewery raw materials and by-products are briefly discussed. A total of 86 samples of beer, 23 of malt, 16 of hops and hop preparations, 11 of spent malt or hops, and 38 of yeast or yeast extract were analysed for aflatoxins; none of the samples studied contained aflatoxins. AJDW

137

Effect of moist heat treatment on sensory qualities of peanut kernels.
Beuchat, L. R.; Koehler, P. E.
Peanut Science 6 (2) 93–95 (1979) [En] [Dep. of Food Sci., Univ. of Georgia Agric. Exp. Sta., Experiment, Georgia 30212, USA]

Shelled Florunner cv. peanut kernels adjusted to 12–13% moisture were subjected to heat treatments at 60°, 90°, and 120°C for periods of 1 and 2 h. Kernels were then dried, oil-roasted, and examined for sensory qualities. Moistened, heated kernels were also inoculated with an aflatoxigenic strain of *Aspergillus flavus* and analysed for free fatty acid (FFA) and aflatoxin contents at weekly intervals over a 6-wk period of incubation at 30°C. Treatment of moist kernels at 60°C for 1 or 2 h caused the FFA content to increase from 1.2% (unheated) to 2.2%, whereas treatment at 90 and 120°C for the same periods of time resulted in FFA contents ranging from 10.3 to 13.2%. After 6 wk, the FFA content of all inoculated and control samples ranged from 11.5 to 14.5%. Sensory panel evaluations of uninoculated, roasted kernels indicated that moist heat treatment at 60°C did not significantly ($P \leq 0.05$) alter organoleptic characteristics; treatment at 90°C for 2 h resulted in significantly lower scores for texture and flavour, whereas treatment at 120°C resulted in a general decrease in all sensory qualities. Kernels heated prior to inoculation with *A. flavus* did not appear to support growth as well as did unheated kernels early in the 6-wk test period. AS

138

Analysis of aflatoxins in milk and milk products by high-performance liquid chromatography.
Goto, T.; Manabe, M.; Matsuura, S.
Agricultural and Biological Chemistry 46 (3) 801–802 (1982) [10 ref. En] [Nat. Food Res. Inst., Min. of Agric., Forestry & Fisheries, 2-1-2, Kannondai, Yatabe-machi, Tsukuba, Ibaraki 305, Japan]

An HPLC method suitable for detecting aflatoxins M_1 and M_2 in milk and milk products is described, using a toluene/ethyl acetate/formic acid/ethanol system (90:5:2.5:2.5) as mobile phase. Min. detectable amounts were 0.2 ng for aflatoxins B_1 and G_1, 0.1 ng for B_2 and

G_2, and 0.5 ng for M_1 and M_2. Aflatoxins were extracted from samples using acetone and purified on an acidic alumina-silica gel-Na_2SO_4 (5 g, 15 g, 15 g layer) column, eluting with chloroform/methanol (97:3). Using these procedures, recoveries of aflatoxins M_1 and M_2 from milk and milk products were >90% and the min. quantitative limit for M_1 was about 0.1 μg/kg. The method was applied to different brands of milk, butter, domestic cheese and imported cheese. No aflatoxins were detected in domestic products, but 2 brands of imported cheese contained M_1 (0.9 and 0.1 μg/kg), the 1st containing M_2 also (<0.1 μg/kg). LMM

139

Ammoniation of whole cottonseed at atmospheric pressure and ambient temperature to reduce aflatoxin M1 in milk.
Price, R. L.; Lough, O. G.; Brown, W. H.
Journal of Food Protection 45 (4) 341-344 (1982) [22 ref. En] [Dep. of Nutr., Univ. of Arizona, Tucson, Arizona 85721, USA]

Aflatoxin-contaminated cottonseed was treated with 1.5% ammonia and 10% water, packed into a 3 × 30 m polyethylene bag and held for 21 days. The ammoniated cottonseed was fed to lactating dairy cattle in 2 different trials. In the 1st trial it was added to a standard dairy ration for 90 cows at 3.5 kg/cow daily for 19 days. Non-ammoniated cottonseed was then fed at the same level for 7 days. Daily analysis of milk from the bulk tank showed no differences in aflatoxin M_1 (from the background level of 0.1 μg/l) until the 22nd day of feeding. Max. aflatoxin M_1 content was 0.55 μg/l on days 25-27. Contents returned to 0.1 μg/l 4 days after resumption of feeding of the standard dairy ration. In the 2nd trial, 2.2 kg ammoniated or non-ammoniated seed were added to rations of each of 6 dairy cows for 7 days. Aflatoxin M_1 reached a max. of 1.8 μg/l in milk from the group receiving untreated cottonseed and a max. of 0.18 μg/l from the group receiving the ammoniated meal. Milk from both groups was negative for aflatoxin M_1 6 days after cottonseed feeding ceased. Ammoniation of whole cottonseed included in the ration of dairy cattle was effective in reducing the amount of aflatoxin M_1 in their milk by approx. 90% but not in completely eliminating it under the conditions used. AS

140

[Aflatoxins in milk and milk products and methods of their determination.] Aflatoksiny v moloke i molochnykh produktakh i metody opredeleniya. [Book]
Mochalov, V. I.
24pp. (1980) [48 ref. Ru] Moscow, USSR; Ts NIITEImyasomolprom Price 0.16r

The author reviews recent literature on the subject with particular reference to aflatoxin contents in milk and milk products, effects of processing methods on their levels in the final products, factors affecting the accumulation of aflatoxins in products, sources of contamination of milk and milk products with mould spores, and methods of detn. of aflatoxins in milk and milk products. FL

141

The inhibitory effects of selected herbs, spices, and other plant materials on mycotoxigenie molds.
Azzouz, M. A.
Dissertation Abstracts International, B 42 (3) 955: Order no. 8118152, 153pp. (1981) [En] [Univ. of Nebraska, Lincoln, Nebraska 68503, USA]

This study examined the effects of 16 herbs and spices, 3 commercial chemical antifungal agents, and 9 other food materials on the growth and mycotoxin production of several mycotoxigenic moulds. Attempts were also made to identify the antifungal agent in white mustard which inhibits aflatoxin-producing *Aspergillus flavus.* Cloves, cinnamon, mustard, allspice, garlic and oregano at the 2% level completely inhibited the growth of all moulds studied. Powdered pomegranate peel at the 2% level was a good inhibitor of the 4 *Penicillium* strains tested. Of the 3 chemical agents potassium sorbate at the 0.3% level was most effective followed by sodium benzoate and calcium propionate. An antibiotic, pimaricin, at the 5 p.p.m. level inhibited all moulds tested. The remaining spices and materials were either non-inhibitory or showed only slight inhibition. Combinations of low levels of potassium sorbate and cloves had a synergistic effect against mould growth. The 6 herbs and spices which completely inhibited mould growth also inhibited mycotoxin production. The antifungal agent in white mustard was identified as allyl isothiocyanate. JA

142

The effects of garlic on mycelial growth and aflatoxin formation by *Aspergillus flavus.*
Mabrouk, S. S.; El-Shayeb, N. M. A.
Chemie Mikrobiologie Technologie der Lebensmittel 7 (2) 37-41 (1981) [24 ref. En, de] [Lab. of Natural Products, Nat. Res. Cent., Dokki, Cairo, Egypt]

To assess the effect of garlic on mycelial growth and aflatoxin formation by 2 toxigenic strains of *A. flavus* (strains No. 182 and M93), unautoclaved minced garlic (i) or aqueous garlic extracts (ii) were added at various concn. to rice powder-corn steep medium with subsequent cultivation at 25°C for 3-30 days (histogram given). Both (i) and (ii) inhibited aflatoxin formation at 0.1-0.5 g/100 ml with (i) showing greater inhibition than (ii), and were fungicidal at 5 or 10 g/100 ml. Further trials were performed on the effects of (i) and minced garlic autoclaved at 121°C (iii) on *A. flavus* M93 in sesame seeds and on *A. flavus* No. 182 on sunflower seeds (histograms given). (i) and (iii) were added at 0 (control) 10-50 w/w% and incubated as previously described. (i) and (iii) inhibited aflatoxin formation, inhibition being more pronounced in (i); at 40% concn. (i) delayed mould growth by 4-10 days; at 50% concn. of (i) no mycelial growth or aflatoxin formation was observed; at this concn. of (iii), aflatoxin formation was considerable. RAW

143

Additives and contaminants in the food supply.
Elton, G. A. H.
Food Technology in Australia 33 (4) 184–188 (1981) [11 ref. En][Min. of Agric., Fisheries & Food, London, UK]

The problems of ensuring that the nation's food supply is wholesome and safe are discussed. The assessment of short-term and long term hazards, and the toxicological testing of food additives are briefly considered. Examples considered are: the use of sodium nitrite as a meat curing additive; the use of saccharin as a sweetener; the presence of heavy metals as contaminants; and the presence of aflatoxin in mould-infested foodstuffs. VJG

144

Chemical and biological evaluation of aflatoxin after treatment with sodium hypochlorite, sodium hydroxide and ammonium hydroxide.
Draughon, F. A.; Childs, E. A.
Journal of Food Protection 45 (8) 703–706 (1982) [19 ref. En][Dep. of Food Tech. & Sci., Univ. of Tennessee, Knoxville, Tennessee 37916, USA]

Aflatoxin B_1 was mixed with 11 concn. of sodium hydroxide, sodium hypochlorite and ammonium hydroxide. Aflatoxin was quantitated by fluorometric detn. and toxicity of aflatoxin treated with NaOH and NH_4OH was evaluated by the brine shrimp assay. Detoxified aflatoxin B_1 was then screened for mutagenicity using the *Salmonella*/mammalian microsome mutagenicity test (Ames test). Sodium hydroxide, sodium hypochlorite and ammonium hydroxide reduced fluorescence by 92, 96, and 94%, resp. at concn. of 25, 11, and 875 mg/50 g. A high negative correlation was observed between decrease in fluorescence and increase in survival of brine shrimp ($r = 0.88$) for aflatoxin treated with NaOH and NH_4OH. Equivalent amounts of aflatoxin B_1 (0.05 µg) and aflatoxin B_1 + detoxified B_1 (0.05 µg + 0.05 µg, resp.) were not significantly different ($P > 0.05$) in the number of revertants resulting in the Ames test. Therefore, aflatoxin B_1 in the presence of detoxified aflatoxin did not increase in mutagenicity. AS

145

High pressure liquid chromatographic determination of aflatoxins in peanut butter using a silica gel-packed flowcell for fluorescence detection.
Francis, O. J., Jr.; Lipinski, L. J.; Gaul, J. A.; Campbell, A. D.
Journal of the Association of Official Analytical Chemists 65 (3) 672–676 (1982) [4 ref. En][FDA, 4298 Elysian Fiels Avenue, New Orleans, Louisana 70122, USA]

A HPLC method was developed for determining aflatoxins B_1, B_2, G_1, and G_2 in peanut butter. The method is based on extraction with acidified aqueous methanol, partition of the aflatoxins into methylene chloride, and purification of the extract on a 2 g silica gel column. The extracted aflatoxins are resolved on a microparticulate (10 µm) porous silica gel column in approx. 10 min with a water-washed chloroform-cyclohexane-acetonitrile solvent that contains 2% isopropanol. The fluorescence detection system determines aflatoxins B_1, B_2, G_1, and G_2 at low levels, i.e., 0.25 parts/billion (p.p.b.) B_1, 0.5 p.p.b. G_1, and 0.2 p.p.b. B_2 and G_2. Multiple assays of 5 samples of naturally contaminated peanut butters containing total aflatoxins ($B_1 + B_2 + G_1 + G_2$) at levels of 1, 2, 3, 9, and 17 p.p.b. gave intralaboratory coeff. of variation of 7, 4, 4, 11 and 3%, resp. Samples spiked at levels of 5, 9, and 17 p.p.b. total aflatoxins showed recoveries of 79, 81 and 81%, resp. AS

146

Susceptibility of strawberries, blackberries, and cherries to *Aspergillus* mold growth and aflatoxin production.
Llewellyn, G. C.; Eadie, T.; Dashek, W. V.
Journal of the Association of Official Analytical Chemists 65 (3) 659–664 (1982) [9 ref. En][Dep. of Biol., Virginia Commonwealth Univ., Richmond, Virginia 23284, USA]

Susceptibility of blackberries, cherries and strawberries to *Aspergillus* growth and aflatoxin production has been examined. 3 aflatoxigenic isolates, *A. flavus* ATCC 15548 and NRRL 3251 and *A. parasiticus* NRRL 2999, were cultured on homogenates of the fruits for 14 days at 28 ± 2°C. % mycelial growth and spore infestation were determined each day with a calibrated grid. At day 14 each culture was frozen at −5°C until aflatoxins were extracted with methylene chloride and water. Aflatoxins were separated by TLC with benzene-methanol-acetic acid (90:5:5). This extraction and solvent system provided satisfactory separations of the aflatoxins and was free of background interference on the TLC plates. Although all fruits served as substrates for both *Aspergillus* growth and aflatoxin production, cherries appeared to be a more favourable substrate than blackberries, and the latter was more favourable than strawberries. Whereas *A. flavus* produced both B_1 and G_1 on all substrates, it yielded B_2 and G_2 only on cherries. Although *A. parasiticus* NRRL 2999 synthesized B_1, B_2, G_1, and G_2 on both blackberries and cherries, no aflatoxins were detected on strawberries. In contrast, *A. flavus* NRRL 3251 failed to produce detectable levels of aflatoxin on any substrate. All substrates supported both mycelial growth and subsequent sporulation with cherries > blackberries > strawberries. AS

147

Studies on aflatoxin production by different aspergilli isolates from soybean.
Shatla, M. N.; El-Shenary, Z.; Basieny, A. M.; El-Khadem, M.; Mhohamed, S.
Monoufeia Journal of Agricultural Research No. 3, 17–34 (1980) [14 ref. En, ar][Dep. of Agric. Botany, Fac. of Agric., Monoufeia Univ., Shebin El-Kom, Egypt]

Aspergillus flavus, A. sydewii, A. nidulans, A. ochraceus, A. melleus, A. quadrilineatus, A. versicolor and *A. niger* isolated from Clark soybeans, and 9 *A. flavus* strains from 3 different locations, were examined for aflatoxin production by incubation in a liquid medium at 18°C for 10 days, followed by mycelia separation, pretreatment and TLC analysis; confirmation of aflatoxin contamination was by a trifluoroacetic acid method. An assay of aflatoxin B_1 from Clark soybeans was done using Ferty Hutton soybeans, and results are discussed. Only *A. flavus* produced aflatoxin, and B_1 production was 0.82–1.420 mg/100 ml, according to the strain. LH

148

[Microflora and mycotoxins during ambient air drying of corn grain.] Mikroflora and Mykotoxine bei der Belüftungstrocknung von Körnermais.
Müller, H.-M.; Thaler, M.
Landwirtschaftliche Forschung, Sonderheft No. 37 (Kongressband 1980), 403–415 (1981) [many ref. De, en, fr] [Univ. Hohenheim, D-7000 Stuttgart 70, Federal Republic of Germany]

Corn grain stored in a bin was ventilated with ambient air from below until a moisture content of 12–13% was reached. During the drying of freshly harvested corn (initial moisture content: 39%) the viable counts of moulds, yeasts, aerobic mesophilic bacteria and the ergosterol content increased at heights of 30 to 130 cm above floor level. If conidia of *Fusarium graminearum, Penicillium expansum* and some other mycotoxin-producing moulds were inoculated before the beginning of ventilation, the mycotoxins zearalenone and patulin were produced. If the moisture content of freshly harvested corn was lowered to 19–27% by drying at high temp. (200°C air temp., grain temp. 90–110°C) and then to 12–13% by ambient air drying, the viable counts of mould, yeasts, bacteria and the ergosterol content did not increase during ambient air drying at a height up to 90 cm above floor level. However, the mould and yeast counts and the ergosterol content increased at heights between 90 and 150 cm. This increase was greater if moulds isolated from dried kernels were inoculated before ambient air drying. There was a significant increase of the viable count of *Penicillium verrucosum* var. *cyclopium* and some other moulds. None of the mycotoxins aflatoxin B_1, B_3, G_1, G_2, kojic acid, ochratoxin A, sterigmatocystin, citrinin, penicillic acid, patulin, zearalenone, diacetoxyscirpenol and T-2 toxin were detected after ambient air drying of pre-dried corn, whether inoculated with moulds before ventilation or not, i.e. high moisture corn can be preserved by combined pre-drying and ambient air drying up to a height of 90 cm above floor level. AS

149

Aflatoxin: toxicity to dairy cattle and occurrence in milk and milk products – a review. [Review]
Applebaum, R. S.; Brackett, R. E.; Wiseman, D. W.; Marth, E. H.
Journal of Food Protection 45 (8) 752–777 (1982) [240 ref. En] [Dep. of Food Sci., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

150

[Aflatoxin residues in milk.] Aflatoxinrückstände in der Milch.
Knutti, R.; Sutter, K.; Schlatter, C.
Swiss Food 1 (6) 17–21 (1979) [8 ref. De, en, fr] [Inst. fü Toxikologie, Eidg. Tech. Hochschule, Zurich, Switzerland]

Bulk samples of milk (approx. 12 000–18 000 l) delivered to a dairy in Zurich in spring 1979 were analysed for aflatoxin M_1 content. 36 of the 38 bulk samples contained no detectable aflatoxin M_1 (<12 ng/l) and the other 2 contained 14 and 50 ng/l resp. Analysis of milk samples from individual farms included in the bulk collection identified those giving milk with high aflatoxin content. The source of contamination was fodder containing groundnut meal with high aflatoxin B_1 content. MEG

151

Fate of aflatoxin M_1 in Parmesan and Mozzarella cheese.
Brackett, R. E.; Marth, E. H.
Journal of Food Protection 45 (7) 597–600 (1982) [16 ref. En] [Dep. of Food Sci., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

3 batches each of Parmesan and Mozzarella cheese were prepared, using milk which was naturally contaminated with aflatoxin M_1. These cheeses were analysed for aflatoxin M_1 content at intervals while Parmesan was ripened for 43 wk or Mozzarella was stored for 17 wk. There was a 5.8-fold enrichment of aflatoxin M_1 in the Parmesan cheese compared with the milk from which the cheese was made. Apparent levels of aflatoxin M_1 in Parmesan cheese started high, decreased until about the 22nd wk of age and then slowly increased until the cheese was 43 wk old, but the final concn. was less than that found initially. There was an 8.1-fold enrichment of aflatoxin M_1 in Mozzarella cheese compared with that in the milk from which it was made. Levels of aflatoxin M_1 in Mozzarella cheese varied slightly but remained near initial concn. throughout the storage period. AS

COPYRIGHT REGULATIONS

Form of Declaration and Undertaking

To the Editor, International Food Information Service, Lane End House, Shinfield, Reading, RG2 9BB, Berkshire, England.

1. I...

   of..

   Hereby request you to make and supply to me a

   photocopy of the article covered by Abstract No. ....

   Journal name..

   Volume .... Part .... Pages .... Year ....

   which I require for the purposes of research or private study.

2. I have not previously been supplied with a copy of the said article/part of the said work by any librarian.

3. I undertake that if a copy is supplied to me in compliance with the request made above, I will not use it except for the purposes of research or private study.

   Signature .... Date ....

   (Note: This must be the personal signature of the person making the request. A stamped or typewritten signature or the signature of an agent is NOT sufficient.)

4. Send this form and remittance (20p per page for photocopies, min. charge £2.00 per article) to the above address. A deposit or credit system for payment is also in operation. Details are available on request.

Note: Additional forms are available on-request.

Food Annotated Bibliographies (FABs)

	1969-81 Price	1982 Price	1983 12 monthly issues Price
1. Application of Reverse Osmosis to Food Processing	☐ £11.00	☐ £6.00	☐ £10.00
2. New Sources of Food Protein	☐ £19.50	☐ £13.00	☐ £20.00
3. Natural and Synthetic Sweeteners	☐ £12.00	☐ £7.00	☐ £11.50
4. Techniques for Analysis of Flavour Volatiles	☐ £13.00	☐ £8.00	☐ £13.00
5. Microwaves in Food Processing	☐ £10.50	☐ £5.50	☐ £10.00
6. Texture Analysis of Foods	☐ £16.00	☐ £8.50	☐ £14.00
7. Synthetic Dairy Products	☐ £11.00	☐ £6.00	☐ £10.50
8. Acidulants in Food	☐ £11.00	☐ £6.00	☐ £10.00
9. Agglomeration of Powders	☐ £11.00	☐ £6.00	☐ £10.00
10. Aseptic Packaging	☐ £11.00	☐ £7.00	☐ £11.00
11. EEC Regulations	☐ £11.00	☐ £6.00	☐ £10.00
12. Toxicology of Food Additives	☐ £12.00	☐ £7.00	☐ £11.50
13. Deep Fat Frying	☐ £14.00	☐ £8.00	☐ £13.00
14. Viscosity of Foods	☐ £12.00	☐ £6.50	☐ £10.50
15. Taste Panels in Food Science	☐ £13.00	☐ £8.00	☐ £13.00
16. Taints in Food	☐ £11.00	☐ £6.50	☐ £11.00
17. Microbial Toxins in Food	☐ £13.00	☐ £8.00	☐ £13.00
18. Smoked Food Products	☐ £11.00	☐ £6.00	☐ £10.00
19. Disposal of Waste Food Products	☐ £15.50	☐ £8.50	☐ £14.00
20. Use of Glucose in Food Products	☐ £10.50	☐ £5.50	☐ £10.00
21. Emulsifiers in Foods	☐ £12.00	☐ £7.00	☐ £11.50
22. Stabilizers in Foods	☐ £12.00	☐ £7.00	☐ £11.50
23. Staling and Antistaling Additives	☐ £10.50	☐ £5.50	☐ £10.00
24. Catering Industry	☐ £10.50	☐ £6.50	☐ £10.50
25. Antioxidants	☐ £12.00	☐ £7.00	☐ £11.50
26. Nitrosamines	☐ £10.50	☐ £5.50	☐ £10.00
27. Content and Analysis of Mercury in Foods	☐ £11.50	☐ £7.00	☐ £11.00
28. Content and Analysis of Lead in Foods	☐ £11.00	☐ £6.00	☐ £10.00
29. Heatable Packs	☐ £10.50	☐ £5.50	☐ £9.50
30. Sulphur Dioxide in Food Products	☐ £11.00	☐ £6.00	☐ £10.00
31. Lactic Acid Bacteria in Beverages and Food	☐ £13.00	☐ £8.00	☐ £13.00
32. Colorants	☐ £11.00	☐ £6.00	☐ £10.00
33. Browning of Foods	☐ £11.00	☐ £6.00	☐ £10.00
34. Aflatoxins	☐ £11.50	☐ £7.00	☐ £11.00
35. Antibiotic Properties and Residues in Food excluding Nisin	☐ £10.00	☐ £5.50	☐ £9.50
36. Nisin	☐ £10.00	☐ £5.50	☐ £9.50
37. Cadmium in Foods	☐ £10.50	☐ £6.00	☐ £10.00
38. Coffee	☐ £11.00	☐ £6.50	☐ £11.00
39. Sorbic Acid	☐ £11.00	☐ £6.00	☐ £10.00
40. Arsenic in Foods	☐ £10.00	☐ £6.00	☐ £10.00
41. Ascorbic Acid	☐ £10.00	☐ £6.50	☐ £11.00
42. Thickeners and Gelling Agents	☐ £9.50	☐ £6.00	☐ £10.00
43. *Pseudomonadaceae* and Food Processing	☐ £10.00	☐ £5.50	☐ £9.50
44. Spores in Food	☐ £9.00	☐ £6.50	☐ £10.50
45. Breadmaking	☐ £11.00	☐ £6.00	☐ £10.00
46. Bread Properties	☐ £10.00	☐ £5.50	☐ £9.50
47. Food Science and Technology Books	☐ £16.00	☐ £10.00	☐ £18.00
48. Nitrates and Nitrates in Meat Products	* ☐ £11.00	☐ £6.50	☐ £11.00
49. Eggs and Poultry Meat	☐ £16.00	☐ £9.00	☐ £14.50
50. Mycotoxins in Foods (Excluding Aflatoxins and Microbial Toxins)	* ☐ £9.00	☐ £6.00	☐ £10.00
51. Meat Canning	* ☐ £11.00	☐ £6.00	☐ £11.00

* Only available from 1974.

Prices include postage by surface mail. For airmail rates, please apply to address below.

To order, or obtain further information, mark the item required, add your name and address and send cash, cheque or postal order to :

INTERNATIONAL FOOD INFORMATION SERVICE (IFIS),
LANE END HOUSE,
SHINFIELD, READING. RG2 9BB.
ENGLAND.

Name..